

General Program

General Program is the main part of the research program category in the National Natural Science Fund. It supports scientists doing basic research on bottom-up based topics within the funding scope of NSFC to conduct innovative research and promote a balanced, coordinated and sustained development of all disciplines.

Applicants should meet the following qualifications:

- (1) With the experience of undertaking basic research projects or doing basic research;
- (2) Have senior professional title or PhD degree, or are recommended by two professionals with senior academic positions (titles).

Post graduate students are not eligible to apply for the General Program, but part time graduate students may apply through their employers if agreed upon by their supervisors.

Applicants should be familiar with the current situation of relevant research in China and the world, capable of leading a research group to conduct research. Home institutions should have necessary experimental research infrastructure for those proposals which need experimental facilities. Applicants should follow the guideline to prepare proposals. The proposed research should be of significance and have research merits, sound theoretical basis, new academic ideas, clear research objectives, detailed research contents and feasible research schemes. The number of collaborative institutions for General Program projects should not exceed 2, and the duration of General Program projects is 4 years.

In 2015, NSFC funded 16,709 General Program projects, an increase by 11.39% (or 1,709 projects) compared with that of 2014, with total funding of 10.24 billion yuan and average funding of 612,900 yuan per project for direct costs. The average funding rate was 22.88%, 2.47% lower than the previous year. Applicants are advised to prepare their research proposals in line with the instructions by respective science departments on funding scale.

Please refer to the sections of each department for detailed funding information about General Program projects.

Funding of the General Program Projects in 2015

Unit: 10,000 yuan

Department	No. of applications	Awards				Funding rate (%)
		No. of awards	Funding for direct costs	Average funding for direct costs	Share of NSFC total funding for direct costs (%)	
Mathematical and physical sciences	5,001	1,533	97,330	63.49	9.50	30.65
Chemical sciences	6,154	1,568	101,980	65.04	9.96	25.48
Life sciences	10,777	2,665	164,640	61.78	16.08	24.73
Earth sciences	5,792	1,554	109,230	70.29	10.67	26.83
Engineering and materials sciences	13,911	2,794	177,270	63.45	17.31	20.08
Information sciences	8,240	1,793	109,000	60.79	10.64	21.76
Management sciences	3,563	700	33,660	48.09	3.29	19.65
Health sciences	19,587	4,102	230,940	56.30	22.55	20.94
Total	73,025	16,709	1,024,050	61.29	100.00	22.88

Department of Mathematical and Physical Sciences

Mathematical and physical sciences studying deep level structures of matter and the laws of its motion are important foundations of natural science, and the precursor and basis for the development of contemporary science. In their own development, mathematical and physical sciences also provide theories, methods and means for other disciplines. Research findings in mathematics and physics play a key role in promoting the progress of both basic and applied scientific disciplines. Disciplines in mathematical and physical sciences are peculiar in characteristics, such as big differences between or among disciplines, and pure theoretical research (such as mathematics, theoretical physics, etc.) and experimental studies. Many disciplines feature “mega-science”, such as high-energy physics, nuclear physics, astronomical physics, high temperature plasma physics, etc.

Mathematical and physical sciences have extensive interactions with other sciences, for example, mathematics with information science, life science and management science, physics with materials science, life science, information science and chemistry, astronomy with earth science, and mechanics with engineering science, material science and earth science. The interactions produce a series of interdisciplinary and cross-boundary disciplines and new research areas have emerged, and at the same time research objects and areas in mathematical and physical sciences are also expanding.

The Department will continue to increase its support to basic research that takes as its primary goals of advancing the disciplinary development, promoting original innovation and training talented researchers and meeting the needs of national long-term development, as well as interdisciplinary research within the Department and with other departments.

According to the strategic needs of the development of mathematical and physical sciences and the overall plan of project funding, the Department has taken some measures in project funding performance and has strengthened macro guidance. In 2016, the Department will continue to pay attention to the following aspects:

- (1) Emphasize on fostering outstanding young talents. In 2015, the principal investigators under the age of 40 in General Program projects reached 48.21%. In 2016, the Department will further increase funding for young researchers and expand funding scale for applicants under age 40, so as to have more young scientists funded and improve their research capability.
- (2) Give more emphasis on creative research and disciplinary development. Multi-level funding to suit the needs of research will be adopted. More funding will be given to studies on developing experimental methods and techniques with innovative ideas aiming to the actual needs, which can be up to 1 to 1.5 million yuan per project. Applicants are advised to pay attention to this policy.
- (3) Strengthen macro planning, and give preferential support to special areas so as to promote sustainable development in these areas. In 2016, preferential support will be given to the following areas:
 - (i) New concepts and new methods in soft matter studies;
 - (ii) Interdisciplinary issues related to mathematics and information science;
 - (iii) Research and development of experimental methods and techniques with novel research idea;
 - (iv) Pre-research on scientific goals of large-scale national projects;
 - (v) Problems driven research in applied mathematics;
 - (vi) Radiation protection and radiation physics;

- (vii) Integration and standardization of computational mechanic software;
- (viii) New principle and methods of X ray, inferred, tetra-hertz generation and imaging;
- (ix) Advanced method and key technologies of nuclear detection and nuclear electronics.

Please indicate the research directions in the note section of the application form when applying for these projects, and choose the proper application code.

- (4) As the governmental investment in the National Natural Science Fund is changing, the average funding for mathematical and physical research projects will also be changed accordingly. Please see the following table for average funding intensity for General Program projects for reference. The funding intensity for experimental research projects will be higher than that of theoretical research projects.

**Funding for General Program Projects
in Department of Mathematical and Physical Sciences in 2015**

Unit: 10,000 yuan

Divisions		Projects	Average funding for direct costs	Funding rate (%)
Mathematic	Mathematics I	193	9,327	32.55
	Mathematics II	198	9,711	29.69
Mechanics	Basic problems and methods in mechanics	6	392	25.00
	Dynamics and control	61	4,084	29.61
	Solid mechanics	152	10,658	29.63
	Fluid mechanics	82	5,502	29.82
	Biomechanics	25	1,666	30.86
	Explosive and impact dynamics	33	2,230	29.73
Astronomy	Astrophysics	41	2,953	33.61
	Astrometry and celestial mechanics	36	2,517	30.77
Physics I	Condensed matter physics	215	14,751	30.76
	Atomic and molecular physics	34	2,280	32.69
	Optics	125	8,537	30.79
	Acoustics	34	2,344	30.63
Physics II	Fundamental physics and particle physics	70	4,295	30.70
	Nuclear physics, nuclear technology and its applications	105	7,406	32.41
	Particle physics and nuclear physics experimental facilities	65	4,684	26.64
	Plasma physics	58	3,993	32.95
Total		1,533	97,330	30.65
Direct cost funding per project		63.49		

Division of Mathematics

The Division of Mathematics encourages creative research on important issues in the mainstream and frontier of mathematics, explorations of new ideas, new theories and methods in mathematics and interdisciplinary applications, intercrossing of different branch disciplines with mathematics, and applied mathematical research on practical issues. Applicants are required to have sound research background and capability. Proposal should be prepared based on deep understanding of the current status of the research involved, main issues and relevant research methods and available approaches. The Division encourages researchers to consolidate research team, foster talents and promote academic exchanges through the funded research projects. Research direction adjustment is allowable when needed. **In 2016, the average funding for direct cost will be 550,000 yuan per project.**

For basic mathematics, the funding aims at maintaining stable development of research directions where China is traditionally strong and has comparatively large-scale research capability, promoting fast development of research areas that are within the mainstream of international mathematical research but relatively weak in China, and promoting interdisciplinary research among branches of mathematics. Focus is given to algebraic number theory, algebraic geometry, low dimensional topology, complex geometry, non-communicative geometry, and mathematical problems in quantum field theory.

The funding for applied mathematics and computational mathematics gives more emphasis on basic theory and new methods with strong practical background and sound potentials for application. NSFC encourages mathematical modeling of practical problems, analysis and computation, and statistical methods and theory for complex data and mass data, and support research on mathematical physical logic, algorithm complexity, discrete probability modeling, optimal algorithm, and combinational algorithm. Focus is given to applied researches such as mathematical modeling and theory of new materials, information processing and control, coding theory and information security, mathematical modeling and analysis in environmental and energy sciences, bioinformation and life system, pathogenesis and control of infectious disease, statistical methods in industry and medical science, data mining and computational statistics, and mathematical methods for economic prediction and financial security.

When applying for interdisciplinary projects, applicants should choose the corresponding mathematical disciplines under Application Code I and the interdisciplinary disciplines under Application Code II.

In order to strengthen funding for problem driven research in applied mathematics, the Division will give preferential support so as to provide a platform for mathematicians and encourage their close collaboration with applied researchers to conduct research closely related to other areas and bring the role of mathematics into full play in advancing the development of science and technology, economy and society. **Please indicate “Problem Driven Research in Applied Mathematics” in the note section of the application form.**

Interdisciplinary Research between Information and Mathematics

In order to promote interdisciplinary research between mathematics and information sciences, in 2016, the Department of Information Sciences and the Department of Mathematical and Physical Sciences will continue to fund interdisciplinary research that requires joint efforts from information science and mathematics. The direct cost funding intensity will be the same as that of General Program projects. The interdisciplinary areas for funding include: mathematical theories in information sciences, mathematical methods

in information security, information system and advanced control theory. Key interdisciplinary research orientations to be funded are listed as the following:

1. Theory and algorithm of integer representation of real numbers

Design the theories and algorithms for the integer representation of real numbers, and the realization of the algorithms by computers and complexity analysis of the algorithm.

2. Theory and methods of formalized representation of software systems

Describe and represent, by using the formalization theory and methods, practical software system not only applicable to real time application software systems, but also to interactive, and discrete event software systems.

3. Theory and methods of security software systems designing

In connection with the analysis and design of typical software systems (system software or application software), study the theory, algorithm and system architectures to improve safety of software system, and verify both theoretically and practically the advantages of such theory, algorithm and system architectures.

4. Theoretical studies on new types of software system architecture

Study, by addressing the contemporary features and needs of software application, the structure, theory and methods of new software system and define appropriate scientific characteristics in combination with practical software system.

5. Theoretical studies on the validation of software systems

Study the theory and methods for the validation of software system development so as to ensure the validity of the developed software.

6. Theory and methods of formalized representation of practical engineering projects

When applying for interdisciplinary projects, applicants should choose the corresponding department (The Department of Mathematical and Physical Sciences or the Department of Information Sciences) under Application Code I and the other department under Code II. "General Program" should be chosen under the "Funding Category" and "Interdisciplinary Projects between Information Sciences and Mathematics" be chosen under Annotations.

Division of Mechanics

The Division of Mechanics mainly supports research on basic problems and methods in mechanics, studies in areas of branches of mechanics such as dynamics and control, solid mechanics, fluid mechanics, biomechanics, explosion and impact dynamics. The Division supports projects with creative ideas in the frontiers of mechanical research on the one hand and projects closely related to the sustainable development of economy, society and national security, and the development of engineering and technology on the other hand. The Division encourages experimental research using the available experimental facilities and key labs in China and advocates interdisciplinary research conducted by scientists from different disciplines. **In 2016, the average funding of direct cost will reach 750,000 yuan per project.**

Research on basic issues and methods in mechanics should focus on theoretical studies on mathematical methods, rational mechanics and physical mechanics, and strengthen the intercrossing with mathematics and physics.

Applications for research in areas of dynamics and control should pay attention to the theory and methods of nonlinear dynamics, strengthen research on vibration and control of complex systems, dynamic modeling and analysis of problems involving the coupling of solid, flexible bodies, fluid, and magnetic bodies, and promote development of non-smooth

and multi-body system dynamics. The Division encourages studies on key issues of dynamics and control problems in major engineering projects, and encourages experimental studies on dynamics and control.

Applications in the area of solid mechanics should give more consideration to intercrossing with physics, materials science, chemistry, information and biological sciences, and strengthen on proposing and studying topics in major engineering application, expand basic theory of continuum mechanics, and promote the development of multi-scale mechanics and multi-field coupled mechanics. Proposals in such areas will be encouraged as follows: the constitutive theory of materials at macro, meso and micro scales; the theory of strength, damage, fatigue and failure mechanism; the mechanical behavior of new materials and structures; experimental measurement techniques and representation methods, high performance computational methods; structural optimization, completeness and safety evaluations, and the deformation, damage mechanism of rock and soil media and stability of rock mechanical engineering, etc.

Applications in fluid mechanics should pay attention to studies on the laws and mechanisms governing complex flows. The Division encourages researches on new concepts, new methods and new technologies in fluid mechanics, especially new experimental methods and advanced measurement technologies, and continues to support studies on fluid mechanical issues in aerospace and aviation, ship and marine engineering, civil and hydrological engineering, and strengthens studies on fluid mechanical issues in energy, transportation, environment and other high-tech and advanced technological areas.

Applications in biomechanics should pay attention to biomechanical and mechanical biology problems related to human health and disease, explorations on mechanical laws in life sciences and clinical medical sciences, and studies on new theory, methods and technologies in biomechanics.

Applications for explosive and impact dynamics should pay attention to frontier areas and major national needs, closely focus on the safety issues of relevant engineering projects, and strengthen theoretical and experimental studies on the dynamic mechanical behaviors of materials, structural response to explosive impacts and detonation mechanisms.

The Department of Mathematical and Physical Sciences continues to support studies on instruments, new experimental methods and techniques with innovative ideas. Applicants for this type of application should mark “Experimental Techniques and Instruments” in the application form. The Department will keep supporting projects in computational software development, giving stress on the integration and standardization research on the development of the computational mechanics software which may produce independent or shared IPR. Applicants for this type are requested to mark “Computational Mechanics Software” in the application form. Applicants of above two types of projects should have relevant research background.

Division of Astronomy

The Division of Astronomy mainly supports researches on astrophysics, basic astronomy, astronomical instruments and technology. In accordance with the trend of astronomical development in the world and the present situation in China, the Division supports research proposals with emphasis on the development of technology and instrumentation. Studies based on existing observation apparatus or facilities to be built soon in China will be encouraged. The Division promotes the combination of innovative ideas, observation and theories, and studies on new technologies and methodologies for astronomy, especially those closely related to mega-science projects under construction in

China. Interdisciplinary research is strongly encouraged so as to gradually build up research teams with special features and influence in international scientific communities. International cooperation and exchange, particularly those using large and advanced facilities abroad for observation and research, will be given much attention.

In the General Program projects funded in recent years, a good balance has been achieved between astrophysics (including cosmology and galaxies, stellar physics and solar physics), basic astronomy (including astrometry and celestial mechanics) and astronomical technology and methods (including the history of astronomy). Young researchers have become the main force in astronomical research and more than half of the awardees are under the age of 40.

In 2016, in addition to strengthening continuous support for projects integrating theory and observation and projects conducted by young scientists, emphasis will be given to interdisciplinary research with physics, space science, etc. Compared with the development in the world, research on planetary physics is rather weak in China, and should therefore be enhanced immediately. On the basic policy of funding the best ones, the Division encourages research on interdisciplinary studies with particle cosmology, celestial bodies in the solar system, and planetary systems in other galaxies, structure and dynamics of galaxies, infrared astronomy, space astronomical measurement, and astronomical research that addresses the national needs. The priority will be given continuously to researches in basic astronomy, astronomical technology and methods, and to relative small scaled astronomical research institutions. **In 2016, the average funding for direct cost will be 750,000 yuan per project.**

In the next few years, the Division plans to give special support to pre-research around the research based on equipment that has already been built or being built, and conceptual studies on new technologies that are urgently needed for large-scale telescope and space exploration. For applicant in these research areas, please mark “Major S&T Basic Facilities Project” or “New Astronomical Technology” in the application forms.

Division I of Physics

The funding scope of the Division I of Physics covers research on condensed matter physics, atomic and molecular physics, optics, acoustics and new research areas formed between these four disciplines and other disciplines.

According to the current status and requirements of disciplinary development, the Division pays attention to study on experimental methods and techniques motivated by creative ideas, and encourages researches in new computational methods and simulation software closely related to experimental physics and explorative types, key basic physical issues serving national needs, and new physical concepts and methods in interdisciplinary areas. The Division encourages especially in-depth studies on important physical problems that have not become hot topics, and researches in new areas and directions. **In 2016, the average funding for direct cost will be 750,000 yuan per project.**

For the funding in condensed matter physics, the Division will pay attention to singular quantum phenomenon in electron related systems, quantum phenomena and quantum effects in various low dimensional and small-scale systems or devices, device physics and advanced technologies and methods of characterization, structural and physical properties of surface, interface and membrane, and physical issues in the structure, performance, preparation and application of advanced functional materials. Encouraged areas include basic physical issues and experimental methods related to soft matters, life science. The

division pays special attention to studies on material, device and physics having important application prospects.

For areas of atomic and molecular physics and optics, the Division encourages researchers to pay attention to atomic, molecular and cluster structures and dynamical process, cold atomic and molecular physics and its interactions with optical field, complex interactions of atomic and molecular systems, interactions between laser and atoms or molecular, physical issues in ultra-fast and extremely strong light conditions, propagation process of light in new media and its characteristics, quantum frequency markers, quantum metrology, quantum information, physics and methods of precision atomic and molecular spectra and precision measurement, high resolution, high sensitivity and high precision laser spectrum and its applications, and research on basic physical issues in micro-nano photonics, optical mechanics, and surface plasma exciter, optical field regulation and its applications. The basic research on the generation, transmission, display and application of 3D optical images will be encouraged. In addition, optical electronics as well as frontier physical issues in optical electronics are also important research areas for funding.

In the area of acoustics, according to the major needs of social development, studies on key fundamental acoustic problems will be encouraged. Physical acoustics and basic research in marine acoustics, ultrasonic and acoustic effect, noise and control, new acoustic materials and devices, acoustic energy exchanger, and issues in information technology, etc., will be in priority.

Division II of Physics

The Division II of Physics mainly supports research on fundamental physics, particle physics, nuclear physics, nuclear technology and its applications, accelerator physics and detectors, plasma physics, and synchronized radiation methods. **In 2016, the average funding of direct cost will be 750,000 yuan per project.**

For fundamental physics, funding will be focused on original studies and interdisciplinary research with other disciplines. Stress will be given to current research frontiers, especially to important theoretical physical issues closely related to experimental studies, and raised from scientific experiments as well as from interdisciplinary considerations.

For particle physics and nuclear physics, the Division will support creative theoretical and experimental research, in particular, the combination of theoretical and experimental studies related to selected large-scale experimental facilities that are in operation, upgrading or to be completed soon both in China and abroad. Funding will be used to guide research towards the understanding of important physical rules related to the latest experimental results, such as the theory and experiments of phenomenology in particle physics and interdisciplinary research of nuclear physics under extreme conditions with nuclear astrophysics and other disciplines.

For support to nuclear technology, accelerator and detector, low-temperature plasma and synchronized radiation, it is hoped that fundamental issues should be drawn from the disciplinary development, national demands and intercrossing with other disciplines, which may facilitate a deeper understanding of physical laws underlying the development of the disciplines and important applications at the same time. Emphasis will be laid on key technologies and innovative ideas in methodology and intercrossing with other disciplines. In addition, the exploration of mechanisms and rules governing the interaction of matter with instantaneous, high energy, high power and strong field radiation (such as charged particles, X/ γ , neutron and electromagnetic fields) are key areas for funding. Attention will

be given to new acceleration principles, nanometer micro-beam, high power ion beam, strong current accelerators, plasma radiation source in accelerator and detector and plasma research, and physics and key technologies of all other advanced radiation sources. NSFC gives strong support to new types of nuclear detection technology and method such as large area, high counting rate, high temporal resolution, low cost and weak signals, etc., and relevant studies on nuclear electronics.

For nuclear fusion and plasma physics, more attention will be given to the exploration of new diagnostic means related to large facilities which are in operation at present or will be built soon. In particular, basic research on advanced magnetic confinement fusion and new approaches to inertial confinement fusion and related fundamental physical problems, and computer simulation and experimental studies of various kinds of plasma will be stressed.

In order to make more efficient use of limited funds, the Division encourages researchers across the country to make full use of large national facilities, small and medium equipment to conduct research, so as to achieve sustainable development in the research. NSFC encourages experimental studies with innovative methods of high resolution diagnosis and detection, as well as the development of experimental facilities, detection and diagnosis devices which are important for the development of accelerators and detectors. Applicants may increase the funding request in applications in these areas according to the actual needs. Projects with more young scientists involved in the research team under the same condition will be preferred.

In 2016, the Department of Mathematical and Physical Sciences will arrange special funding in certain areas, and continue to support innovative development and improvement of instruments, advanced experimental techniques and methods, advanced method and key technologies in nuclear detection and nuclear electronics, and radioactive physics, radioactive protection and environmental protection.

Department of Chemical Sciences

Chemical science is to study the composition, structure, property and reactions of matters, and it is the central science which is closely intercrossed and permeated with and into other disciplines, such as materials science, life science, information science, environmental science, energy science, earth science, space science and nuclear science. Chemical engineering is aimed to accomplish the transfer and conversion of matters and energy by making use of the principles of the basic discipline of Chemistry, and to solve scientific issues raised in the large-scaled production of chemical materials and products.

The mission of the Department is to improve the overall quality and international status of China's basic research in chemical science, and foster creative talents and groups in chemical research with international influence. The Department supports the multi-level and multi-scale research on the reaction, process and function at different levels of atoms, molecules, molecular aggregation and condensed state, as well as studies on the complex chemical system. In accordance with major scientific problems raised from the national economy, social development, national security and sustainable development, researches on chemical science and chemical engineering are encouraged for exploring their role in fields of life, materials, energy, information, resources, environmental science and human health. The Department promotes the combination of microscopic and macroscopic research, static and dynamic states, and theoretical research and empirical development of novel experimental methods and analytical precise technologies. It is also encouraged that the introduction of latest theories, technologies and achievements from other disciplines into the

research for facilitating the sustainable development of research in chemical science and chemical engineering, fostering innovation and interdisciplinary studies, and supporting the emerging frontiers in research.

**Funding for General Program Projects
in Department of Chemical Sciences in 2015**

Unit: 10,000 yuan

Division		Projects	Average funding for direct costs	Funding rate (%)
Division I	Inorganic chemistry	196	12,737	26.17
	Analytical chemistry	168	10,917	26.29
Division II	Organic chemistry	282	18,367	26.58
Division III	Physical chemistry	292	18,977	26.19
Division IV	Polymers	148	9,618	26.38
	Environmental chemistry	179	11,672	26.72
Division V	Chemical engineering	303	19,692	22.30
Total		1,568	101,980	25.48
Average funding per project		65.04		

In 2015, 6,154 proposals for free application from 608 research institutions were received by the Department (23.18% higher than that of 2014). 1,568 proposals were funded with the success rate of 25.48% and the average funding intensity of 650,400 yuan per project.

In 2016, the Department will continue to promote high quality research in the cutting edge fields, lay stress on in-depth and systematic research work, give priority to interdisciplinary research projects, and take effective measures to support original creative and high risk research. In the process of assessment, scientific merit will always be the core concept, and the balancing, coordinating and sustainable development of all related disciplines will be thoroughly considered for the promotion of the fundamental research of chemical sciences in China at international frontier. In 2016, the average funding intensity per project will be at the same level as that of 2015.

Division I of Chemistry

The Division supports research in fields of inorganic chemistry and analytical chemistry.

Inorganic Chemistry

The Division will give its funding priority for researches on fundamental scientific issues of inorganic chemistry related to materials, life sciences, energy, information, environment and resource, etc.

Inorganic chemistry is aimed to develop new synthetic methods and approaches, reveal reaction mechanisms and rules, carry out function-oriented research on the controllable synthesis, structure and property of new compounds, strengthen studies on the functional assembly and composition of inorganic materials, intensively study the relations between structure and property of inorganic matters as well as the theoretical principles, and enhance studies on devices and properties of inorganic materials by making full use of the modern characterization techniques. The chemical bases of biological effects of inorganic elements,

especially research on bioinorganic chemistry beyond molecular level, inorganic bionic processes and bio-macromolecules combined with metal are emphasized.

In recent years, the research quality of inorganic chemistry in China has been greatly improved. Inorganic chemists have paid more attention to the creativity of research theme and made outstanding achievements in some areas. In the studies on the synthesis and assembly methods of inorganic materials, more applicants have emphasized on the mutual relations between structure and property as well as creative academic ideas. However, there are still some problems as follows: a great number of proposals for coordinated chemistry, molecule-based material chemistry and inorganic nano-material chemistry have been funded by the Division. The research contents were mainly focused on synthetic methods and structural characterization, and the study on the reaction process mechanism, relation and rule between the structure and property is going to be enhanced. More proposals are expected in regard to solid inorganic chemistry, especially those on function oriented synthesis and its application research. As for the proposals of bioinorganic chemistry, more attention should be paid in mechanism study on biochemical process of metal ion or inorganic small molecule. The proposal for basic research and fruitful achievements in the area of radiochemistry should be further improved. Inorganic chemistry research should carry out more distinctive, systematic and thorough work with an emphasis on the research characteristics.

In 2016, applicants should focus their proposals on the development of inorganic synthetic chemistry and assembly methods, pay more attention to the combination of theory with experiment, and emphasize research on correlated regulations of structure and property of inorganic matters. Finally, proposals with creative ideas in the areas of solid chemistry, bioinorganic chemistry and radiochemistry will be encouraged. Those function-oriented design ideas, creative and leading research are more than welcome.

Analytical Chemistry

Analytical chemistry is to study the component and structure of matters and to determine their chemical composite, content and distribution in different time and space. It covers wide fields including spectrographic analysis, electrochemical analysis, chromatographic analysis, mass spectra analysis, NMR analysis, stoichiometry, surface and interface analysis; and inorganic analysis, organic analysis, biological analysis, environmental analysis, pharmaceutical analysis, food analysis, clinical analysis and legal medical test, characterization and analysis of materials, quality control and process analysis, instrument development and its combining-use technique, etc., as well as newly emerged omics-analysis, imaging analysis, in vivo analysis, single molecule and single cell analysis, microfluidic and chip analysis chemo-informatics and bioinformatics, etc. The creative research related to the above areas will also be supported such as new principles, new methods, new techniques, new instruments, new installation, key devices and so on. Those extended studies focused on certain important scientific issues will be especially encouraged.

The funding scope of analytical chemistry ranges from macro complex structure to the precise analysis and detection of a single molecule, aiming at building innovative and general technologies and methods. For example, new methods of detection and imaging for rapid chemical processes and electron transfer process, new methods of chemical metrology for big data analysis and interpretation, new theory and new methods for sensor related research, and the widening of the application range of the existing technology in the field of important science are encouraged.

The current development in the area of analytical chemistry is very fast with obvious features. The features are incarnated from the applications as follows: (i) The research

system has become complex system from simple one, focusing on “-omics” sample and living object, etc.; (ii) More profound studies were stressed on unicellular and mono-molecular level; (iii) Prospective, fundamental and innovation have been taken seriously in the research contents; (iv) Research targets have been extended from components of substances to structure, morphology, stereo-conformation and function, meanwhile data mining and processing are more emphasized; (v) Research is not limited to the instrument analysis based on the tradition and simple principle, and new principles and knowledge from nano-science and microfluidic controlling techniques, bionics and physics, etc., have been more and more brought into the creation of new methodologies and new technologies of analytical chemistry.

Based on proposals received and projects funded in recent years, the tendencies of disciplinary development are shown as follows: (i) To emphasize the research on methodology creativity, integration and intercross-discipline, integration of methods and information processing; (ii) To stress the studies on mutual action, signal transformation and action mechanism of related materials; (iii) To pay attention to the development of pre-treatment, separation and identification technologies of complex samples; (iv) To stress the development of instruments, including not only the development of whole set instruments, but also the improvement of key instruments, and upgrade of performance; (v) To strengthen the research on new techniques and methods of detection and diagnosis related to life sciences; (vi) To combine analytical chemistry closely with the frontier areas such as functional materials, resource and environment, new-type of energy, exploration of aviation/space and so on.

Division II of Chemistry

The Division supports research projects in areas of organic chemistry and chemical biology.

Organic Chemistry

Organic chemistry is to study the sources and components, the synthesis and characteristics, the structures and properties, the reaction and conversion, and the functions and reactive mechanism of organic compounds, which is one of the key disciplines for preparing new substances.

From the vertical point of view, the organic chemistry research continuously deepens the disciplinary connotation and extends the discipline from micro to macro level. The purpose is to fully reveal molecular structure-property relationship of time and space, chemical bond formation and fracture and the regularity of intermolecular interactions, and in turn to search for the optimal condition for material conversions, and gradually realize the creation and application precision of organic materials. From the horizontal perspective, organic chemistry proactively promotes the interdisciplinary integration with other disciplines and catalyzes new growing points, which promote the solution of important scientific problems in the fields of energy, health, and environment and so on, and facilitated the national economic and social development.

The main features of current research in organic chemistry are incarnated as follows: The systematic knowledge of structure, transformation and interaction of organic matter is constantly deepening, which promotes the discoveries of new reactions and new reagents. Organic chemical reactions and synthesis pay more attention to selective precise control and atomic/steps economy. The activation and conversion of inert chemical bonds and small molecules, cheap metal catalysis, green synthesis, bio-mass conversion have become the

frontiers for sustainable development. New structure/reactive molecules and biological compatibility reaction have provided key materials and research methods to solve the problem of life science at a molecular level. The original innovation of materials science has been promoted by creating new functional materials and intelligent assembly system.

In recent years, remarkable progress has been made in basic research on organic chemistry in China, not only in scope but also in depth. Areas such as organic synthesis methodology have been among the most advanced ones internationally and formed a number of characteristic systems. However, based on the proposals received in recent years, there are still some problems for the development of organic chemistry in China such as insufficient originality and systematization, obvious homogenization research, weak ability to develop and lead a new area and new direction, unbalanced development of sub-discipline and the serious tendency of publication oriented utilitarianism. The Division will continually support the development of sub-disciplines, encourage those projects with original innovation and systematization guided by scientific problems, emphasize the research ideas, research direction, research content and the diversification of evaluation methods, focus on original breakthroughs in basic research and contribution to industry based on the organic synthesis with the core target of material conversion, and further strengthen the intercrossing with physics, material science, life science and other fields.

Chemical biology

Chemical biology is the science to accurately modify, manipulate and explain biological systems at the molecular level by means of exogenous chemical substance, method and route. It not only develops new reactive technologies and molecular tools, but also provides new knowledge and concept for research in the area of life sciences. It is playing an increasingly crucial in the research of visual, controllable and creatable life processes. It is to reveal living innate characters used for means and idea of chemical science, meanwhile it is also to promote development and innovation of the discipline based on understanding and exploring to living system.

Chemical biology focuses on the processes and rules of important molecular event in life science, and gives full play to the characteristics and creativity of chemical science. Study focuses are: (i) to achieve, explore and regulate the living action with real-time, in-situ and quantity by using design and synthesis of molecular probe; (ii) to develop diversified catalytic and non-catalytic reaction with bio-compatibility, as well as its reactive mechanism, rule and application in living system; (iii) to exploit new method and technology for synthesis of biological macromolecules, such as protein, nucleic acid, polysaccharide, etc., and bio-micromolecules, such as lipid compounds, coenzyme factor, living nature products, etc.; (iv) to establish, optimize and utilize small molecule compounds library and high-throughput screening technology to detect the biological process in cell by interference of small organic molecules, thereby to reveal unknown pathways and new life activities of interaction of biological molecules, promote the study of signal transduction and gene transcription activity based on small molecules, and realize the identification of drug targets and the discovery and development of leading compounds; (v) to synthesize target molecule or completely special chemical reaction by using biosystem (e.g. microbe) and/or bionic work unit (e.g. enzyme); (vi) on the basis of above works, to develop new theory and technology used for life science or living system, carry out chemical assembly and simulation of complex living system, exploit new technique for disease diagnosis, solve chemical biological issues in medicine and carry out research into the frontier issues related to life.

The Division will encourage those intercrossing projects with core content as chemical material, reaction and technology, and preferentially support the themes on: (i) synthesis of

chemical molecular probe and utilization in living process, and study on the molecular mechanism of important biological events; (ii) new method and new technique of analytical detection for important substance and process in living system; and (iii) study of molecular mechanism in key biological events, in order to strengthen basic research of solving biological events by use of chemical means for promoting intercross and cooperation between chemistry, and biology and medicine. The discipline intercrossing has been well implemented in most of the applications in the past two years, and it is expected to be further strengthened.

Division III of Chemistry

The Division supports research projects in areas of physical chemistry and theoretical chemistry.

Physical chemistry and theoretical chemistry provide the theoretical basis of chemical sciences. The research contents of physical chemistry and theoretical chemistry have been enriched gradually and the research objects have been extended from mono-molecules, molecular aggregates to condensed states, and from weak interaction between molecules to the formation of chemical bond. By using of experimental means and theoretic methods of physical chemistry, the information could be acquired in terms of molecular structure and dynamic changes from ground states to excited states and from steady states to transient states. Research on physical chemistry and theoretical chemistry has the following trends: the combination of macroscopic and microscopic studies, the combination of bulk phase and surface/interface, the combination of static and dynamic states, and the combination of theory and experiment. These trends have been furthered into the study on the regulation of chemical reaction and structure/function of substance. As the intercrossing of physical chemistry and theoretical chemistry with energy science, environmental science, life science, materials science and information science, many new sub-disciplines have been generated. Physical chemistry has been playing a more and more important role in the development of chemistry and related sciences.

Among the proposals received and funded by the Division, catalysis chemistry has been one of the most active research areas in physical chemistry, and more and more attention is paid to the essence of catalytic action in studies. More and more studies on electrochemistry and colloid and interface chemistry focus on the basic physicochemical issues in materials and life sciences, so the number of proposals and funding concerned has been steadily increased. Research areas of chemical thermodynamics and kinetics have been broadened, and development and application of microcosmic research means in these areas have become a new trend. The development of theoretic chemical method has been emphasized. It has become a new growth point that theories and experimental methods of physical chemistry could be used for solving major issues in life science. However, researches on experiment methods of physic-chemistry and the development of novel instruments, particularly for the research and application of spectroscopic methods, should be further strengthened.

The Division encourages applicants to give play to the discipline's strengths, focus on scientific frontiers, meet the national needs, and emphasize creative, systematic and prospective studies for developing new concepts, new theories and methods. The intercrossing research with other disciplines and the basic research with important theoretical significance and potential for application in the areas of energy, information, environment, materials and biomedicine will be advocated. Meanwhile, the Division invites researchers of other disciplines to apply for interdisciplinary projects, and applications

should stress the scientific problems correlated with physical chemistry in their proposals.

Division IV of Chemistry

The Division funds research projects in areas of polymer science and environmental chemistry.

Polymer Science

Polymer science deals with the synthesis, molecular structure, chain structure, condensed state structure, properties and functions of polymers as well as their processing and application. The scope of polymer science covers the research on soft matter, including synthetic polymers, bio-macromolecules and superamolecular polymers.

In the field of polymer chemistry, it needs to develop the synthesizing methodologies of polymers, explore the novel catalysts or initiators for polymerizations inspired by new ideas from other disciplines, and develop the reaction with mild, high efficiency and high selectivity. It also needs to stress polymerizing reaction with controllable structure and molecular weight as well as its distribution, pay attention to biosynthesizing methodologies and the chemical reaction involving polymers, and emphasize the polymers synthesized by non-oil resource, and polymers with new structure, such as superamolecular polymers, hyper-branched polymers, dendrimer and chiral polymer. Meanwhile the Division will attach importance to the mass production methods of the photoelectric functional polymers.

In the field of polymer physics, it needs to deepen the understanding of the basic laws of condensed state physics of soft matter. Main tasks including: to pay attention to polymer crystal, liquid crystals and glassy states and their phase transitions, and the structure of condensed state with multi-stage and its dynamics; to pay attention to research on surface and interface of polymers, size effect of micro or nanostructure on properties of polymer; to enhance studies on the polymer solution and rheology, and to stress the research on theory of polymer, as well as methods for the bridge up gaps in multi-scale simulation; to stress the research on polymer physics related to biological systems; to stress on the condensed state physics of the semi rigid chains of photoelectric conjugated polymers.

In the field of functional polymers, it should be addressed to develop and add knowledge in new functional materials and functional system of polymers, e.g. polymers with electric, optic and magnetic functionalities, polymers correlated with biology, medicine and pharmacy, as well as polymers with the function of adsorption, separation, reaction agents, catalysis, biosensing and molecular recognition; to promote the functional polymer as advanced soft matter used in those technologies related to the fields of energy, information, biomedicine or environment, especially emphasize the polymers related to energy technology; to find novel issues from studies of natural polymers and bio-macromolecules, so as to develop the crossover research between synthesized polymers and bio-macromolecules; to stress the studies on responsive polymers, environmental friendly polymers, self-healing polymers and bioinspired and biomimic polymers. A new growth point is the synthesis of the two-dimensional function polymer and the porous covalent polymer frameworks.

As for the polymer assembly, the research focuses on the supramolecular polymers and polymer supramolecular assemblies. It needs to study the assembly processes between polymer and polymer, polymer and small molecule, and polymer and the molecular aggregates, the multiple weak interactions effects and their essence between supramolecular building blocks and interface, the ordered assembly with different size and shape by regulating the non-covalent interactions, and in turn to implement the function.

For applied science of polymers, it needs to further creatively develop the method for optimizing polymerization processing of major category of polymers. It should be stressed to explore new technology in polymer fabrication and processing. It is encouraged to extract important fundamental issues from polymer industries, and pay attention to the research on high performance polymer, polymer composites, chemical fibers, polymeric elastomers, flame retardant polymer, natural polymer, hybrid polymer and reactive oligomer as precursor of thin films, composites and coatings.

It is necessary to strengthen the research on the basic scientific issues and classical issues of polymer science, which particularly needs the intercrossing and thorough research of the above-mentioned fields.

It should be noted that in recent years, few proposals have been received in methodologies of polymerization and structural characterization.

Environmental Chemistry

Environmental chemistry contains the following branches: environmental analytical chemistry, environmental pollution chemistry, pollution-controlled chemistry, pollution ecological chemistry, environmental theoretical chemistry and the relation of chemical pollutants with human health. Research on environmental chemistry has been developed rapidly along with the comprehensiveness and intercrossing with other disciplines. Now, environmental chemistry is playing an increasingly important role in moving forward the frontiers of basic research, solving national major environmental problems and so on.

Environmental chemistry is mainly to study the principles and methods of occurrence, transportation and transformation, effects and control of chemical substances, especially pollutants, in various environmental matrixes. Research contents of proposal are gradually opened up from microcosmic mechanism to macrocosmic rule, combined with in-situ work and theoretic computation and simulation, and enhance the creativity and systematization. But there are certain problems in some proposals, e.g. lack of new ideas when selecting theme; less focusing on fundamental scientific issues; giving no prominence to the key points; simple repetition and no clear technical scheme.

Based on the proposals accepted in recent years, major research orientations include: (i) identification, new analytic principles, methods and technologies of pollutants; (ii) environmental chemical behavior and microscopic mechanism of pollutants in multi-matrix system, and evolutionary process and mechanism of regional environmental qualities; (iii) forming mechanism and controlling principles of air pollution, polluting chemistry and control of water body environment, polluting process and renovating technology of soils, and technologies and reusable principles of treating solid waste substances; (iv) green chemical process and environmental efficacy in the utilization of new energy; (v) application and safety of nano-materials in pollution controlled process; (vi) effects of chemical pollutants on ecological environment and human health, and (vii) relations of structure/effects and dose/effects of pollutants and forecast model of environmental pollution.

The Division encourages applicants to carry out the research on key scientific issues of environment chemistry in areas of environmental characteristics, molecular transformation, ecological and health effects, and risk and control of pollutants, in consideration of real environment condition and by means of modern scientific means and methods.

Division V of Chemistry

Funding areas by the Division cover two disciplines, the chemical engineering and

industrial chemistry.

Chemical engineering and industrial chemistry are to study the motion, transfer, reaction and interrelation in the conversion processes of matter. It is aimed to recognize the phenomena and rules of transfer of matter in the conversion processes and its effect on the reaction and properties of products, develop technologies, flow chart and equipment for the clean and high effective conversion of substances, and establish theories and methods of design, scale-up and regulation and control for use in industrial production. New ideas, concepts and methods as well as their application in chemical engineering and technology will be especially emphasized.

In recent years, basic research of chemical engineering in China has made great progress, research quality has been constantly enhanced, and research ideas have also become more and more innovative and unceasingly opened up. Extracting key scientific issues from complex industrial systems and forming step by step systematic theories and key techniques have become a major trend in areas of chemical engineering and industrial chemistry. A lot of new research contents are raised as follows: (i) the observation, measurement and simulation of micro-/meso-structure, interface and multi-scales, beside the measurement and correlation of macro-properties, and more attention on the optimization and regulation of structures, reinforcement of processes and scale-up rules; (ii) the uncommon and extreme processes, beside common systems; and (iii) the chemical product engineering, beside chemical processing engineering. Nevertheless, there are still some problems that proposals with original creative idea and works with breakthrough are not enough, and especially those proposals combined with key scientific issues based on national needs are even rare. The Division encourages that researchers in basic areas, especially in traditional chemical engineering areas, should keep up their defined study direction instead of blindly following hot subjects, and carry out their research intercrossing and integrating with other disciplines.

Under the guidance of the national goals and social needs, the Division will give preferential support to studies on basic theories, key applied technologies and sustainable development in chemical engineering and industrial chemistry to enhance the overall national comprehensive strength and creative ability. Particular focuses will be given on the following studies: (i) research of frontier subjects in new and high technologies of chemical engineering and newly emerged disciplines, which should be good at extracting the chemical engineering issues from the intercrossing study of multi-disciplines and emphasizing the development and innovation of scientific theory and technological mean; (ii) key technologies in chemical engineering related to the national economy and people's welfare, which should strengthen systematic basic research and accumulation to understand the laws, improve existing theories of the discipline and bring the guiding role of basic research into full play.

The following research areas will be encouraged: thermodynamics and basic chemical engineering data, inorganic chemical engineering, chemical pharmaceutical engineering, chemical process equipment and safety, chemical engineering related to metallurgy, chemical engineering related to environment and resources, as well as transfer processes in uncommon condition with creative ideas.

Department of Life Sciences

The funding of the Department of Life Sciences covers a broad spectrum including biology, agricultural sciences and basic medicine, which extends to various fields of resources, environment, ecology, population and health, etc. In recent years, with the support from NSFC and other funding sources, together with unremitting efforts made by

Chinese scientists, research in life sciences has achieved extraordinary progress in China. Not only the number of authentic research articles published by Chinese scientists in international authoritative journals is climbing, but the quality of research is improved rapidly.

**Funding for General Program Projects
in Department of Life Sciences in 2015**

Unit: 10,000 yuan

Divisions		Projects	Average funding for direct costs	Funding rate ++ (%)
Division I	Microbiology	167+7*	10,599+175*	25.66
	Botany	187+7*	11,881+175*	25.80
Division II	Ecology	163+7*	10,381+175*	25.07
	Forestry	167+7*	10,616+175*	23.45
Division III	Biophysics/biochemistry/molecular biology	144+3*	9,138+75*	31.89
	Immunology	71+4*	4,526+100*	30.49
	Biomechanics and tissue engineering	86+8*	5,467+200*	26.18
Division IV	Neurosciences	77+4*	4,906+100*	29.35
	Psychology	46+4*	2,940+100*	24.04
	Physiology and integrative biology	79+4*	4,988+100*	32.68
Division V	Genetics and bioinformatics	125+6*	7,925+150*	25.74
	Cell biology	101+5*	6,419+125*	34.98
	Developmental biology and reproductive biology	72+4*	4,596+100*	29.80
Division VI	Agriculture and crop sciences	197+8*	12,478+200*	21.44
	Food science	174+8*	11,025+200*	17.98
Division VII	Plant protection	126+6*	8,021+150*	21.75
	Horticulture and plant nutrition	135+6*	8,589+150*	21.83
Division VIII	Zoology	133+5*	8,446+125*	31.80
	Animal husbandry and grassland science	112+6*	7,115+150*	23.74
	Veterinary medicine	114+6*	7,222+150*	21.66
	Aquaculture	69+5*	4,362+125*	21.14
Total		2,545+120*	161,640+3,000*	24.73
Average direct cost per project		61.78 (63.51**)		

Note: * Pilot Projects of Small fund for Exploratory Studies; ** Average funding for general program project excluding of Small Fund for Exploratory Studies; ++ Funding rate including Projects of Small Fund for Exploratory Studies

In 2015 the Department of Life Sciences received 10,777 proposals, of which, 10,562 were accepted for General Program and 2,665 projects were funded, including projects of Small Fund for Exploratory Studies, with a funding rate of 24.73% (accounted by the accepted proposals, and all the data bellows are also calculated by the number of accepted

proposals). The average direct cost is 617,800 yuan per project, among which, there are 2,545 projects funded as 4-year General Program projects. The funding rate for 4-year General Program projects is 23.62% and the average funding intensity is 635,100 yuan per project. In the future, the Department will continue to emphasize on funding decision according to the research quality and actual need rather than funding in equal intensity. The Department also expects that the home institutions of applicants should pay close attention to academic standard of research and improve the quality of proposals.

In 2016 the funding of General Program projects is expected to keep constant as the previous year. The applicants should apply for funding according to the actual need of the research. When writing proposals, in addition to filling in the budget form, applicants should attach the detailed description of the budget to the proposal, so as to allow peer reviewer and panel expert to evaluate. For proposed research having more exploratory nature but with weak research basis, we suggest applicants apply for lower funding. For those with solid research basis and recent important progresses in previous work and requiring more funding to carry out further investigation, applicants may apply for higher intensity of funding according to the actual need. It should be noted in particular that the budget in proposals will be evaluated by peer reviewer and the panel.

The Department has been encouraging researchers to carry out original study with innovative academic ideas, as well as novel technology and approaches, particularly for those playing a pivotal role of prompting the development of related disciplines with authentic ideas. Emphasis will be put on proposals with novel theories, firm hypotheses and the interdisciplinary importance based on previous research over a long period of time. The Department will pay attention to important frontiers and new emerging fields in life sciences in the future, while keeping a balanced and harmonious development among various disciplines. The Department continues to encourage studies concerning basic research on morphology, structure and function of cells, tissues, organs and systems, and actively support researches related to human physiology, biochemistry, immunology, reproduction, development, aging, stem cell and tissue engineering, etc. Studies will be encouraged on aiming at fundamental level scientific questions of life sciences using various disease models. Pivotal investigations to agriculture sciences and environmental ecology are encouraged.

The Department encourages researchers to carry out systematic and innovative work focusing on key issues over a long-term period, therefore, great importance to project management at later stage. The Department implements the funding policy depending on the performance of previous funded project, and gives preferential consideration to applicants with good performance in their previous projects under equivalent conditions. Moreover, considering the problems commonly occurred during the application and peer review processes in recent years, the Department reminds applicants to pay special attention to the following points when writing proposals:

- (1) In the explanation part of the Guide to Programs of the Department of Life Sciences, as well as of the eight scientific divisions, the funding scope of the Division is emphasized and the categories that are not to be accepted have been clearly noted. Therefore applicants should read carefully according to their subject of application. It should be stressed, that the categories not to be funded by the Division in the General Program Guide may apply to other types of programs in the same Division.
- (2) Concerning applications related to medical ethics, applicants should give the certification of ethic committee from their host institutions or the superior administrative agencies. For research using genetically modified organisms, the source should be indicated, and if donation is needed from other laboratories, the

- agreement from the donors should be attached.
- (3) Concerning applications related to operation with highly pathogenic microbe, applicants should abide by national regulations concerned, and perform under bio-safety qualified conditions.
 - (4) For applications involving international cooperation or with team members living abroad, applicants should provide confirmation from the overseas members. The signature of both the applicant and all participants should be in regular script, and the signature should be the same as the one in printed form in the application. Any kind of “personal signature” which is not inconsistent with the printed form is not acceptable. Please note specially that the signature and the name in printed form may not be in different languages, for instance Chinese and English; otherwise, the proposal may be declined due to determination difficulty.
 - (5) Please fill in the research period according to the notes requirement for application in this guide. If the start time is earlier than the deadline of the applications, they will be declined.
 - (6) The applicants should note that the fund is filled in the unit of ten 10,000 yuan. Misfiling will cause errors in the budget, leading to a decline.

Applicants should follow the requirement of the Guide to Programs and the application syllabus when writing their proposals. Otherwise, the proposals will be rejected or not funded.

Division I of Life Sciences

The funding scope of Division I covers two disciplines, namely microbiology and botany.

Microbiology

The Microbiology discipline supports basic research in the area of microbes, including fungus, bacteria, archaea, virus, prion and other microbes. Major funding fields in this discipline include resources and taxonomy of microbe, microbe ecology, microbe group behavior, metabolism, physiology and biochemistry of microbes, microbe genetics and evolution, microbe epigenetics, microbe morphological differentiation, structure and function of microbes, synthetic biology of microbe, the interaction between microbes and their hosts, the relationship of microbes and environment, the pathogenesis and drug-resistance of pathogenic microbes, etc.

There is an obvious lack of balanced development of different branches in microbiology, observed based on previous years of grant application and funding situation. The number of proposals aiming at study on mycoplasma, rickettsia, chlamydia, spiroplasma, phage, prion, etc., is relatively small, indicating that the related research team needs to be augmented and intensified. The discipline of Microbiology encourages researches carry out fundamental and authentic studies in the fields listed above. Preferential support policy will be given to these fields in the year of 2016.

In 2016, the discipline will continue to give preference funding to areas in the taxonomy of microbes, and taxonomy research combining novel technology such as whole genome and big data with traditional methodology is especially encouraged.

The discipline encourages the exploration of novel techniques and methodologies applied to basic research of microbiology, and especially welcomes scientists in physics, chemistry, and information sciences to carry out interdisciplinary studies related to microbiology; encourages research based on single microbe cell, structural compositional

research of microbe, basic research in pathogenic microbe and marine microorganism, and functional research on microbe in complex system; systematic research to mechanisms of frontiers in life sciences applying microbe as model system is preferentially encouraged.

Botany

The discipline of Botany supports basic and part of applied basic researches on plants. It mainly covers studies in areas of structure of plants, taxonomy (including flora geography), plant evolution biology, paleobotany, plant physiology, plant biochemistry, plant morphology, plant development, plant reproductive biology, plant chemistry and natural product chemistry, endangered species protection, resource plant (including economic botany), marine/ocean botany, ethno botany, interaction between plant and environment, plant secondary metabolism, plant nutrition and substance metabolism, plant germplasm (including conservation and innovation of germplasm), as well as the exploration of new techniques and methodologies related to botany.

It can be seen from the applications accepted and funded in recent years that the development of each branching field within the Botany discipline has been unbalanced. There are relatively more applications in areas such as plant phylogeny, plant hormone, growth and development, and resistance physiology, and therefore the research quality is relatively high. Systematic and creative research should be further strengthened henceforth. Besides, emphasis on interdisciplinary study is put to the application of novel technologies on those relatively developed fields listed above. On the other hand, there are fewer applications in the fields such as paleobotany, biological nitrogen fixation, photosynthesis, respiration, water physiology, mineral elements and the metabolism, organic synthesis and transportation, physiology of seed, plant introduction and acclimatization, plant germplasm, hydrophytes and ocean plant and resources, etc. Applications that have research basis in the above-mentioned subjects will be encouraged. Applicants are also encouraged to carry out their studies in the fields of plant systems biology, plant tropism biology, invasive plant biology, the totipotency of plant cell, molecular basis of major plant property, and plant response to environmental change, etc.

The discipline of Botany will continue to give preferential support to plant taxonomy in 2016, especially to strengthen the support to young taxonomists. The discipline encourage applicants to carry out research on species revision of certain families and genus on the world wide range and plant resources research in key areas and special environment. Meanwhile, since the research on plant resources is relatively weak in China, multidisciplinary and integrated research is specially encouraged to pay attention to key scientific issues during the process of introduction and plant germplasm protection for promoting effective protection and utilization of domestic plant resources of China.

The interdisciplinary studies of botany with other related fields will be strongly encouraged, especially with mathematics, physics, chemistry, geosciences, and ecology, genetics, genomics, proteomics, metabonomics, bioinformatics and computer science, etc. Studies are also encouraged on the discovery and development of novel instruments, technologies and methodologies applying to further research in botany, such as new detection techniques, high-throughput screening techniques, advanced imaging techniques, analysis techniques of high efficiency, etc. To encourage applicants to put forward unique or typical scientific issues based on their strength and research basis, the discipline will intensify its support to projects with high degree of creativity. In order to achieve better use of local advantages, resources advantages, and talent training, the discipline will encourage collaborations among applicants with institutions or groups having unique special advantages.

Division II of Life Sciences

The Division supports researches in areas of ecology and forestry.

Ecology

Ecology studies the interaction between organisms or between organisms and the environment. It plays a pivotal role in solving the national ecological problems that are getting increasingly important. The Ecology discipline covers molecular and evolutionary ecology, behavior ecology, physiological ecology, population ecology, community ecology, ecosystem ecology, landscape and regional ecology, global change ecology, microbe ecology, pollution ecology, soil ecology, conservation biology and restoration ecology, and evaluation of ecological safety, etc.

In recent years, significant progress has been achieved in ecological study in China. However, the overall quality of fundamental ecology needs to be improved. The discipline will strengthen its support to applications with strong innovative ideas, multidisciplinary research and cutting-edge growing subjects, give priority support to proposals focusing on the basic research frontier of international ecology, closely connected with the national ecological and environmental issues, give preference to researches with possibility of making breakthrough in new theory and novel method, and strengthen basic research with long-term observation and experiment of field work, and encourage researches perform study on landscape and regional scale.

In 2015, a large number of applications were accepted in fields of ecosystem ecology, conservation biology and restoration ecology, physiological ecology, pollution ecology, community ecology, globe change ecology, population ecology, and molecular ecology, etc., but relatively fewer applications were received in the areas of evolution ecology, behavior ecology, landscape and regional ecology and civil ecology. In the future, the discipline will strengthen its support to biological ecology, including micro evolution ecology, species differentiation, and pedigree ecology. The discipline encourages studies on behavior ecology, civil ecology, landscape and regional ecology, and soil ecology. Continuous encouragement is put on special-regional ecology studies in the Fund for Less Development Regions.

The discipline reminds applicants to pay attention to the following points in 2016: The content of research proposal should focus on key points with clear definition of scientific issues, and special attention should be paid to scientific aspect and feasibility of the research route and methods. Proposals regarding to the multidisciplinary and macro research should put enough emphasis on the combination of the theoretical study with the national need.

Forestry

Forestry is to reveal the essence and mechanisms of the biological phenomena by taking forest and xylophyta as its research objects, in order to carry out the cultivation, protection, management, and utilization of forest resources. The Forestry discipline covers studies in fields of forest resources, forest resources information, wood physics, chemistry of forest products, forest biology, forest soil science, silviculture, forest management, forest health, tree genetic breeding, nonwood product forest science, landscape architecture, desertification, and water and soil preservation, as well as related new technology and methodologies in forest related studies.

In recent years, there is a tendency of rapid growth of basic research on forest, but the unbalanced development among sub-disciplines remains the key issue. It is shown from applications in recent years that the number of proposals submitted to branches such as wood physics and the chemistry of forest products is large, while there are much fewer

applications to the more classical sub-disciplines like silviculture, forest soil science and forest management, indicating a trend to shrinking. The proposals failed to focus on important basic scientific issues in some important fields, such as silviculture and nonwood product forestry.

There are two major features in basic research of forest. The first one is to meet the national needs for forestry development. Therefore applicants should pay close attention to formulating the important and key scientific questions from the forestry industry. The second is to carry out continuous and in-depth studies regarding to perennial woody plants for a relatively long period of time. In the future, the discipline will continue to prioritize to support basic research in such core fields like silviculture, the health care, the efficient utilization of forest resources, etc. The discipline will encourage researchers to carry out investigation in fields of advanced generation tree breeding theory and methods, multi-service function of forest and management, forming mechanism of wood superior traits, the analysis of the specific growth, silviculture, forest soil science, forest management, garden planning and landscape architecture and development mechanisms of trees, which meet the national strategic needs at the international frontier research fields.

In 2016, applicants should pay close attention to the following: proposals should focus on targeted scientific questions with a precise title; according to objects and contents of research, the application code should be specific; applicants should provide detailed and specific research plan to demonstrate the feasibility of the project; the discipline of Forestry will not accept proposals on pharmaceutical functional verification of effective components targeting at animals.

Division III of Life Sciences

The Division covers disciplines as follows: biophysics, biochemistry and molecular biology; immunology; and biomechanics and tissue engineering.

Biophysics, Biochemistry and Molecular Biology

Biophysics is a cross discipline to investigate mechanisms of biological problems and phenomena, applying the theory and method of physics; Biochemistry and Molecular Biology is a discipline to study chemical composition of living organisms as well as chemical changes during the process of life, and to research the life phenomena and activities of life process at the level of biological molecules. The Division mainly supports studies on the following issues: (i) structure and function prediction of biological macromolecules, protein crystallography, NMR, biological mass spectrometry, electron microscopy, small angle scattering and its composites; structure of protein complex and membrane-proteins; novel structural biology methodology for functional study and predictions of macromolecule; (ii) the interaction between macromolecules (including small molecules); (iii) the role of post-translational modifications on stability and function of proteins; (iv) classical biochemistry of protein and peptide, nucleic acid and enzymology; (v) molecular mechanisms of sugar/lipid/nucleic acid metabolism; (vi) computational biology, bioinformatics, systematic biology and synthetic biology; (vii) interaction and regulation between bioplasma membrane and membrane proteins; (viii) studies on polysaccharides and glycoconjugates; (ix) the effect and role of the physical environment to organisms, including microgravity and space radiation; (x) novel technology and methodology in biophysics, biochemistry and molecular biology.

Considering the contents of applications received in recent years, fields with more applications as well as more funding are the following: structure and function of protein

complexes, which have in-depth researches with sound background and accumulation. Among studies on protein structure, the number of applications aiming at function of protein complex as well as membrane proteins is climbing; researchers and application numbers of cryo electron microscopy are developing fast; NMR study on macromolecules remains the same with previous years. The proposals accepted on the interaction of biological macromolecules can carry out their research closely connected with important vital movement of cells. There are comparatively high-quality applications in areas of nuclear biochemistry, including non-coding RNA metabolism, post-transcription modification and their interactions with proteins for various function and regulation. As for studies on the structure and function of biomembrane, the quality of applications is relatively high in transmembrane signal transduction and transportations across membrane. Proposals in areas of structure computing and theoretical forecasting of large biological molecules and bioinformatics have well reflected the character of the intercrossing of disciplines. Researches on bio-effect and functional mechanisms of ionization and the electromagnetic radiation to organisms, and proteomics are inadequate in the quality of proposals. Applications for structure and function research on glycoconjugates and environmental biophysics showed significant improvement in recent years. Applications on acoustic biophysics, photo-biophysics and space biology are few. There is a wide range of research directions covered by new techniques and methods in the area of biophysics and molecular biology, and some applications have creative ideas in terms of the development of disciplinary intercross methodology and new technology in recent years. Interdisciplinary studies for novel technology and methodology are encouraged.

As a discipline with bio-molecules as the object of study, focusing on methodology, the discipline will continue to encourage studies on investigation of life phenomena on the level of molecules. Funding priorities is given to the following fields: (i) researches on the methods of structure computing and forecasting of large biological molecules and complexes, protein crystallography, nuclear magnetic resonance spectrum, bio-mass spectrometry, electronic microscope, small angle scattering, etc., for studying the structure and function of protein and complexes; biological studies on the protein complexes and membrane protein structure, and the development of new structural biology methods for the structure determination and function study of proteins and other large bio-molecules; (ii) applications with new methods and ideas from mathematics, information sciences, and interdisciplinary subjects, to carry out researches on bioinformatics, systems biology or integrative biology; (iii) molecular mechanism studies of the regulation of glucose, polysaccharide glycol-conjugates and lipid biochemistry will be moderately encouraged; (iv) applications on the mechanisms of environmental physical factors to organisms, and research on the effect of space factors to organisms in micro gravity, space radiation conditions will be moderately encouraged.

Immunology

Immunology is a frontier and leading discipline in life sciences and basic medicine. The funding areas of the discipline include molecular immunology, cell immunology, immune response, immune tolerance, immune regulation, immunogenetics, reproductive immunology, mucosal immunology, vaccine, antibody engineering, and novel technologies and methodologies of immunology, etc.

The discipline mainly supports basic research aiming at the structure, development, function and abnormal mechanisms of immune molecules, cells, tissues, organs, and immune systems. The core funding areas include:

- (1) Gene expression and regulation, structure and function of immune molecules; structure basis of immune recognition; recognition, activation and effects of innate

- immunology; molecular mechanisms of antigen presentation; structure, function and immune-pathogenic of cytokines and chemokines;
- (2) The differentiation, development, migration, tissue distribution of immune cells and sub-cells and their functional modulation, evolution and comparative immunity;
 - (3) Identification, response and regulation of innate and adaptive immune; infectious immunity; tumor immunity; self-immunity; hypersensitivity; initiation, progression and elimination of inflammation; mechanisms and intervention of non-infectious diseases;
 - (4) Cell and molecular mechanisms of immune tolerance; malfunction of immune tolerance; mechanisms of transplant immune tolerance; abnormal immune response and immunodeficiency;
 - (5) Molecular and cellular mechanisms of immune regulation; abnormal of immune regulation; nerve-endocrine-immune network; immune metabolism;
 - (6) Immune heredity; genetic basis of immune-related diseases; epi-genetic regulation of immune response;
 - (7) Immunological mechanisms of reproduction and pregnancy; cross-interaction between reproductive endocrine and immune system;
 - (8) The function and mechanisms of mucosal immunity and local immunity;
 - (9) Basic immunology problems during the manufacture of vaccine;
 - (10) Studies of antibody engineering, including: scientific problems on the establishment of new techniques and methods and new research system of immunity.

It is clearly demonstrated from the applications in 2015 that there is a rapid progress of immunological research in China, with the proposals covering a wide range of subjects, and the quality of research contents improved obviously. Most of the proposals were based on solid background and pre-studies; some applications analyzed the possibilities of technical failures and were able to provide alternative resolutions as backup plans; a few proposals were carrying out systematic cutting-edge studies based on novel hypothesis. However, there are problems such as lack of substantial subject intercrossing, etc.

In 2016, the discipline will continue to support applications with creative academic thoughts, stable research directions, solid academic basis; encourage applicants to concentrate scientific problems from their former research and practice to carry out in-depth exploration of mechanisms targeting at specific scientific target; encourage the establishment of typical research system and techniques platform, and highlight the setting-up and application of various novel methods and techniques in immunological studies; encourage study in areas of systems immunology, immunomics and computational immunology; encourage basic research relating to the structure of immune system and abnormal function, and the close cooperation of scientists working in basic and clinic studies.

Biomechanics and Tissue Engineering

This discipline is a branch intercrossing of life science with other research area. The funding scope covers biomechanics and biorheology, biomaterials, tissue engineering, biomedical electronics, bionics and nano-biology.

The funding of biomechanics and biorheology fields includes: the coupling of molecules-cellular mechanics-chemistry on cellular-subcellular-molecular level, the mechanical property and its mechanisms on system-organ-tissues aspects, mechanical simulation and modeling, and mechanics of biomaterials.

The funding of biomaterials mainly covers studies on the regenerative medicine; biomaterials for tissue engineering; implants, interventional biomaterials, and biomaterials of artificial organs; drug or gene carrier biomaterials; surface and interface of biomaterials

and its biological effects, compatibility and safety of biomaterials.

The funding of tissue engineering fields includes: regeneration and construction of skin, bone and cartilage, blood vessel and heart, mouth, nerve, blood and myocardium, muscle and tendon, liver and cholecyst, pancreas, kidney, urocyt, etc. Studies on in vitro three-dimensional constructions of malfunction tissues such as tumor are also covered in this branch.

Bioelectronics and bioimaging mainly cover biomedical-signal detection and recognition, biosensor, biomedical imaging and image processing, appropriators and systems of biosystem detection.

Subjects mainly involved in the field of bionics include: molecular bionic, bionic function and mechanism, bionic materials, bionic surface interface, bionic device and system.

Nanobiology mainly covers studies in areas of nano-biodetection, nanocarriers and delivery, nano-biological effect and its safety.

According to applications in recent years, there is an imbalanced development among the above five sub-disciplines. In the sub-discipline of biomechanics, projects were mostly in the such fields as biomechanics of cellular and molecular biomechanics, bone and other tissues and organs of the movement, while biomechanics studies on other organs were rare; in tissue engineering, most projects focused on bone and cartilage tissue engineering, oral tissue engineering, stem cell transplantation and tissue regeneration, but were lack of proposals on other important organ tissue engineering, as well as novel methodology; in the biological image and bioelectronics devices sub-discipline, there was a lack of study on biomedical signal detection and analysis, biomedical sensing, biomedical detection and system applications; in the field of nano biology, few studies were proposed on nano-bio safety evaluation. Most of the proposals funded in 2015 showed solid research basis and provided clear scientific questions with novelty. The main weakness of applications was lack of original ideas, or lack of substantial interdisciplinary collaboration.

In 2016, the discipline will continue to encourage applications to carry out systematic multidisciplinary research in fields of biomechanics and biorheology, biomaterials, tissue engineering, biomedical electronics, bionics and nano-biology. Researches should aim at key scientific issues in the rocess of important tissue/organ reconstruct engineering, as well as interdisciplinary studies, especially long-term, systematic and in-depth study in tissue/organ replacement and repair, engineering reconstruct and transformation of regeneration.

In particular, the discipline encourages and supports the basic research in tissue biomechanics basis and the practical application, other than bone/joint motion system, and cardiovascular system; study on interaction mechanisms and new effect features between biological materials and the body; the novel methods and new technology of tissue engineering (such as 3D printing, biological manufacturing); studies on bioelectronics and biological systems related to the study of bionics, and nano biodetection, nanometer biological safety evaluation and application of ethics.

Special notes for applications: biomaterial and bionic research other than biology/biomedical applications is excluded in this discipline.

Division IV of Life Sciences

The Division's funding areas cover three disciplines: neuroscience; physiology and integrative biology; and psychology.

Neuroscience

This discipline is to study the structure and functions of nerve system, and investigate the essence and mechanisms of human/animal behaviors and cognition activities. The goal of this discipline is to explain the structure and function of neuronal system as well as the brain at various levels.

The funding areas of neuroscience cover molecular neurobiology, cellular neurobiology, developmental neurobiology, sensory neurobiology, system neurobiology, behavioral neurobiology, computational neurobiology, and other related studies concerning techniques and approaches of neuroscience.

About 40% of the proposals submitted and projects funded in 2015 are focused on molecular neurobiology and cellular neurobiology. The third largest group of applications was abnormality of neuronal structure and function (for instance, development of neurodegenerative diseases), taking up about 12% of total number of applications, whereas there are fewer applications under the applying code of novel technology, computational neurobiology and neuronal informatics. The funded proposals normally demonstrate high degree of novelty, with precise description of scientific questions and proper research plans. Areas with the most funding include generation, maintenance and differentiation of neuronal stem cells; neuronal mechanisms of learning, memory and behavior; neuro-degeneration diseases; damage and repairing of neuronal system; function and plasticity of synapses; neuronal basis of mental disorders.

In 2016, the discipline will continue to encourage basic research in the following areas: analysis of molecular, cellular and circuit mechanism of brain activity; interdisciplinary study of neuroscience with chemistry, physics, and materials, etc.; studies related to malfunction of neuronal system to reveal mechanisms of diseases at various levels such as molecules, cells, circuit and body; the development, improvement and application of new techniques relating to optogenetics, nerve transsynaptic tracing, bio-molecular imaging, etc.

Special notes for applications: cognitive studies with human being should apply to the discipline of Psychology.

Physiology and Integrative Biology

This discipline has two sub-disciplines: Physiology and Integrative Biology. Physiology is a subject to study the phenomena of life activities, principles and regulation. The funding scope covers the physiological function and its mechanisms of homeostasis control under normal conditions, as well as the change of structure and function of human cells, tissues organs and the sustainable homeostasis control and the related research. Integrative Biology is an emerging discipline of science to depict quantities and predict biological function, phenotype and behavior, and to investigate the operating law of information flow. The discipline emphasizes on innovative studies in the area of integrative biology from molecules to the body level, revealing the mechanisms of body homeostasis control.

In 2015, funding for circulation physiology is mainly for researches on blood pressure regulation, blood vessel malfunction and system, arrhythmia, and myocardial remodeling and function renovation: proposals funded in the area of respiratory physiology focus on respiratory dynamics; structure, function, regulation and abnormal in respiratory system; lung injury and repair; respiratory centers and respiratory regulation; pulmonary vascular smooth muscle and pulmonary arterial hypertension. The area of digestive physiology covers investigation on the function of stomach, intestinal, liver, gallbladder, pancreas and body's protection mechanisms upon damage. Proposals funded in the area of urinary physiology cover regulation and control mechanisms of water-salt metabolize of kidney, renal fibrosis, and functional regulation of ladder. Most of the applications supported in the

area of reproductive physiology cover researches on the occurrence and fertilizing of germ cells, implantation of embryo, and the regulation and control mechanism of the placenta function. Most of the applications in neurosystem concentrate their researches on the hypoxic-ischemic encephalopathy, neurodegeneration, injured nerve repair, brain and cognitive behavioral, etc. Most of the applications in the area of exercise physiology mainly focus their researches on the physiology mechanisms of the health by exercise, and the prevention and treatment of diseases. Most of the applications in the area of human anatomy concern about basic research of applied anatomy. The embryology, which covers regulation mechanisms of embryo development, tissue damaging and regeneration, is the major funding area as well. Moreover, endocrine, and glucose metabolism, lipid metabolism, insulin resistance, trace elements (include calcium and phosphorus metabolism) nutrition, senescence, and biological rhythm as well as hemopathology are the key funding areas as well. The discipline will continue to encourage innovative researches on aging and biorhythms, as well as studies on the functional integrative and regulative mechanisms between different systems. In 2016, basic scientific problems based on disease model will continue to be encouraged.

Please note in particular that applications concerning researches about plants, microbes, traditional Chinese medicine, wild animals (except comparative physiology) and livestock are not accepted in this discipline.

Psychology

Psychology studies human mind and behavior, aiming at ultimately understanding initiation, development, performance and regulation mechanisms of cognition, emotion, motivation, intelligence, consciousness, and personality, via various levels of investigations from molecule, gene, physiology, brain, to behavior, population and computational modeling.

Scientific experiments and quantitative analysis are introduced to allow psychology growing into an independent discipline from philosophy. Due to the complexity of study object, psychology research is becoming a combination of multi-level and multi-angle one, with more and more specialized branches and series of interdisciplinary layers. Armed with novel technologies and methodologies of neural science, information science, medical science and engineering science, multiple branches of psychology study are providing interpretations and analysis to the material basis of psychological activities: brain and its structure and function.

The main subjects supported in psychology discipline include cognitive psychology, experimental psychology, developmental and educational psychology, physiological and medical psychology, social and personality psychology, genetic psychology, health psychology, clinical psychology, consulting psychology and applied psychology (including engineering psychology, exercise and sports psychology, management psychology), as well as the brain structure and neural basis of cognition, learning and memory, attention and consciousness, language and thinking, and techniques and methods of cognitive science, etc.

Many researchers are focusing on fields of cognition psychology, biology psychology, medical psychology, development psychology and social psychology, whereas fields in education psychology, applied psychology and sports psychology are relatively lack of research. In the near future, it is speculated that studies in the following fields will achieve breakthrough: psychology process and mechanisms of learning and memory, sensory perception and multi-channel integration, psychology mechanisms of emotion and behavior control, psychology stress and intervention, human cognition and development of social behavior, as well as mechanisms of mental disorders and early recognition.

In 2015, most grants applied to cognition psychology, making 25% of total applications. Development psychology, social psychology and medical psychology covered 10% each, while there were fewer grants on genetics psychology, stress psychology, individual psychology and cognition simulation. Statistics from funded grants showed that topic on perceptual information processing, memory and thinking mechanism in cognition and neural mechanism of decision making and problem were mostly funded in cognition psychology; social development and cognition development were the most funded areas in development psychology; social behavior and mental disorder in medical psychology were top sub-fields in social psychology.

In 2016, the discipline will pay more attention to engineer psychology, personality psychology, psychological genetics, medical psychology, etc. The discipline will continue to encourage multi-discipline study, applying novel neuronal imaging, gene analysis, brain stimulation, big data analysis, system tracking, etc., so that to prompt the increase of the scientific significance and research level of psychology study. The discipline encourages interdisciplinary studies so that to concrete national requirement of development, especially to stress researches on social hotspot with Chinese characteristics, and to encourage applied research to play fully the prompting role of psychology to the national social development.

Cognitive sciences studies on human being are encouraged.

Division V of Life Sciences

The funding scope of the Division covers the following three disciplines: genetics and bioinformatics; cell biology; and developmental biology and reproductive biology.

Genetics and Bioinformatics

Genetics is to study the inheritance and variation of organisms on various levels of molecules, cells, individuals and populations. Bioinformatics is an interdisciplinary field of biology and computing science, aiming at the exploration and improvement of methods and means to obtain, store, manage and analyzes biological data.

The funding scope of the discipline mainly covers human genetics, plant genetics, animal genetics, microbe genetics, genomics, molecular genetics, epigenetics, cell genetics, population and evolution genetics, bioinformatics, behavioral genetics, biostatistics, synthetic genetics and systems biology, etc.

The genetics discipline will give priority support on the following fields: the study of genomic variation and evolution law of complex biological characteristics, including the identification, analysis of key genetic function and its regulating rules; genetic diversity; the correlation between phenotype and genotype; the genotype in analysis and the express prediction of complex traits and complex diseases; the evolution model and mechanisms of genetic variation for important populations; study on the genetic and molecular basis of genetic disease of single gene and complex diseases of multi-genes, including identification of genomic function variation, recognition and prediction of disease genes, and molecular signal route concerned; studies on basic genetic laws and the molecular mechanisms of gene expression and regulation by using model organisms; the establishment of genetic operating system, new methods and technologies of phenomics and genetic breeding; basic researches on the genetic law of typical resources, major agriculture crops, microbe, etc.; and the molecular basis of genetics and variation of organisms under extreme or special environment; novel genetic fields such as chemical genetics, photo-genetics, phenotype-nomics, 3D genomics, etc.

In 2015, the numbers of applications received in areas of animal genetics, microbe

genetics, plant genetics and animal cell genetics were relatively small, whereas those fields are pivotal concepts in classical genetics research. The discipline will prioritize proposals with solid previous studies and novel scientific questions in the above branches. New application code has been established for heredity and variation to support relevant research in the field. In 2016, the discipline continues to encourage original studies on genetic mechanisms and basis.

As for bioinformatics, the discipline mainly supports the development of new algorithm and analysis techniques, which are used to study genomic structure, function and evolution; mass data integration and systems biology analysis; integration, standardization and visualization of bio big data; design and synthesis of molecular module and network. It is encouraged to carry out combination study between bioinformatics analysis and experiment verification of organisms.

The discipline will continue to encourage and support research on new theory and methodology, as well as interdisciplinary study of genetics.

Cell Biology

Cell biology is to study the principles and mechanisms of life activity. Cell biology is mainly aimed at revealing the structure, function, phenotypes and regulation mechanism at molecular, cellular and individual levels within organisms, as well as studies on cytological mechanisms of phenotype and functional abnormal occurrence of organisms.

The funding scope of the discipline mainly includes: cellular and organelles structure, components and their assemblage mechanisms; regulation mechanisms of cell growth, division, and cell cycle; stem cell biology; cell differentiation; cell polarization; maintenance of cell homeostasis; cell senescence; cell death; autophagy; movement of cells; cell signal transduction; extra cellular matrix; vesicle transportation (including endocytosis and exocytosis); material and energy metabolize of cell; intercellular interaction; cell and environment; cell and microbes; host cell interaction with virus; new materials, new technology and methodology used in cell biology study.

Studies on the structure and function of cells have been the major aspects supported by the discipline. Applicants are encouraged to carry out integrated studies on the mechanisms of synthesis, modification, degradation, localization, and translocation of protein with the aggregation, dissociation, location of its components, and the activity diversification with time and space of protein complex during the process of cell signal transduction with dynamic change mechanisms of life activities of cells. Highlight will be given to endeavors on solving important problems in basic cell biology upon using cell models or model systems, in combination with techniques and methods of genetics, developmental biology, chemical biology, and cell imaging technologies, etc.

Among the applications accepted in 2015, there were fewer applications in areas of cell growth and multiplication, extra cellular matrix, establishment of cell polarity, cell substance transportation, cell metabolism, plant cell biology and research of new methods, whereas the above areas are pivotal in cell biology and have foundations in related researches in China. The discipline will prioritize funding to applicants who present their proposals with scientific issues from their solid research background on these aspects. In 2016, the discipline will continue to emphasize on functional and mechanism issues, highlighting the utilization of various novel research technologies and methodologies in cell biology. The discipline will actively promote the development of techniques in cell in situ and real time, dynamic and high resolution analysis, and highly value integrated researches from molecular to cellular and individual levels, so as to reveal different molecular mechanisms closely linked with cell function and biological effect and regulation network.

Developmental Biology and Reproductive Biology

The funding scope of this discipline covers three research fields including developmental biology, reproductive biology and stem-cell biology. The ultimate goal is to explore the basic rules of gametogenesis, fertilization, embryo development, the occurrence and growth, homeostasis, damage recovery and regeneration, aging of various organism tissues and organs.

The key biological issues in Developmental Biology (animals, including human) include: proliferation and migration of embryo cells; the determination of embryo polarity; the induction and differentiation of germ layers; cell lineage and cells fate determination; morphogenesis of tissues and organs; growth and shape control of tissues and organs; organ homeostasis maintain and regeneration; tissue and organ senescence; abnormal development and related diseases; evolution of development mechanisms and influence of environment to development, etc. The key biological issues in the area of plant developmental biology concern mechanisms of organogenesis and cell differentiation, especially the molecular regulating mechanisms study of fertilization, zygotic activation, the development of embryo and endosperm, nutrition, and the occurrence and development of breeding organs; organ aging; resolution of signal transduction of flower induction and gamete development; the study of the maintain of stem-cells and its function of growing point; and the exploration of the relationship between development and evolution.

The key biological issues in Reproductive Biology include: sex determination; gonad differentiation, development and aging of reproductive organs; the fate determination, migration, multiplication of primordial germ cells; the occurrence and maturation of gamete; development of plant anther and ovary; occurrence of follicular and ovulation; interaction of germ cells and somatic cells; the sperm-egg reorganization and fertilization; early embryo development and implantation; and apomixes; influences of genetics, epigenetics and environment factors on reproductive health; the mechanisms of reproductive system diseases; the security of assisted reproductive techniques; and the regulating role of reproduction, and the regulation function of reproductive endocrinology.

Key scientific issues in the area of stem cell biology include: embryonic stem cells; reproductive stem cells; tissue stem cells; disease related stem cells; plant stem cells; stem tip and root tip; plant cambium; cell reprogramming and induced pluripotent stem cells; nuclear transfer of somatic cells; embryogenesis of plant somatic cells; resting and activation of stem cells; the proliferation of stem cells and maintaining of pluripotency; self-renewal of stem cells; cell cycle regulation of stem cells; the directional differentiation of stem cells; senescence of stem cells; malignant transformation of stem cells; stem cells and microenvironment; immunogenicity of stem cell; cell trans-differentiation; stem cell and tissue and organ engineering, etc.

In 2015 the number of applications on developmental biology and stem cell was relatively big, some of which were able to aim at the international frontier. In reproductive biology branching, research was closely related to human reproductive clinical practice, taking into account the basic and applied studies, reflecting the research trend of transformation from basic research to clinical medicine.

Modern developmental biology and reproductive biology emphasize on the continuity of development and dynamic process of change, emphasize the collaborative function of multi-cells and multi-genes, value the relationship of development and diseases, and encourage the exploration of molecular regulating mechanisms of development and reproduction by using model organisms. Applications will be encouraged on the creative development of research methods and systems, as well as the establishment of model diseases concerning development and reproduction, so as to provide basis for clinical

transformation. In the field of plant development and reproduction, applications of basic research which may provide theoretical guidance for modern molecular breeding will be encouraged.

Division VI of Life Sciences

The Division covers two disciplines: basic agriculture and crops, and food sciences.

Basic Agriculture and Crops

The discipline mainly supports basic researches targeted at crops and the systems of their environment. The studies emphasize on the laws of crop growth and development; the interaction between crops and environment; the genetic improvement of crops; and the production of crops as well as related issues covering branches of basic agriculture, crop cultivation and farming system, physiological ecology of crop, germplasm resources, genetic breeding of crops and crop seed science, etc.

The main aspects of crop science are as follows: the germplasm and gene resources of crops; genetic and molecular mechanisms of important crop property formation; the interaction between crop and environment; the high-yield theory of crop, rules of resource utilization with high efficiency; and the quality control of crop seed and yields. The discipline encourages scientists to carry out researches driven by scientific issues based on crop production and sustainable development of agriculture, focusing on basic study around the above fields. The discipline will encourage basic research with the combination of modern genomics, biotechniques, bioinformatics and traditional crop science for targeting on scientific frontiers of crops and the national future demands of agriculture industry. Studies on crop information science, which combine information techniques, computing biology, systems biology with crop science, will be promoted. Researches on crop physiological ecology and cultivation regulation carried out around the high-yield, fine quality, high efficiency, the resilience production of crop, and as well as the high efficient utilization of resources will be encouraged. Endeavors on studies of cultivation, physiological and genetic system by using crop varieties and their parental materials which are broadly used in production, and studies on germplasm resources innovation by using new techniques and methods (like atomic energy, etc.) and related theory will also be encouraged.

It is reflected from the applications in recent years that there was a climbing number of proposals with basic issues on topics meeting the national demand of agriculture, an obvious increase in interdisciplinary studies around basic agricultural issues, and a diversified distribution of host institutions of applications. However, major problems remain as the following: (i) researches on crop genome are generally concerned, but more attention is yet to pay on further exploration of mechanisms of physiology and genetics; (ii) following-up work with the international frontier is increasing, but it should be performed in close combination with practical issues of national agricultural production, so that to provide potent support of basic research to applied research; (iii) most of the applications are lack of systematic and sustainable studies; (iv) there are more applications in agricultural information, utilizing physical methods (such as spectrum, infrared, remote sensing, 3D photography, etc.) to acquire agricultural information, but there is a lack of in-depth theoretical study, and difficulty exists on actual utilization; (v) some of the proposals are not standardized with inaccurate information, such as untrue or incorrect contents in the resume part, especially in the order of authors for publications, or the list failed to present the real contribution of the applicant and others.

Applications to this discipline should take crops and crop products as their research objects, and the interdisciplinary studies with other subjects should not depart from the principal object; otherwise proposals will be rejected. The discipline will encourage the organic combination of new theory, techniques with traditional methods, laboratory work with field experiments, and support will be preferentially given to continuous and systematic work.

The discipline does not accept applications with research objects of agricultural animals, animal products, microbe, forest, vegetable, traditional Chinese medicine, algae, woods, and model plants of *Arabidopsis thaliana*. Please fill in the application code to the final level (four digits or six digits, such as C1302, C1305, C1306, C1307 or C13XXXX). Applications fail to provide the detailed code will not be accepted for further review.

Food Science

Food science studies the physical, chemical, biological, nutritional and safety properties of food and food materials, as well as principles of food storage processing, the theory and methods enhancing the nutrition value of food and security. Integrating theory and methodology of various subjects in biology, chemistry, physics, nutrition, microbiology, and agriculture, food science covers a broad spectrum of food material science, food biochemistry, food fermentation and brewing, food nutrition, food processing, food storage, transport, and preservation and, food safety, etc.

The discipline mainly supports basic researches based on food and raw food material as research objects, covering basic food materials science, food biochemistry, food fermentation and brewing, food nutrition and health, biological basis of food processing, food storage and fresh keeping, food safety and quality control. Research on health care products is not in the supporting scope of this discipline. In 2016, the discipline will give its priority to important scientific issues concerning the national development of nutrition and health, and factors restricting the growth of Chinese food production industry. The proposal with higher creativeness, continuous and systematic work, and substantive multidisciplinary study will be especially encouraged. In food nutrition and health, the discipline will support with priority the basic study of interaction among food components, changes in nutritional quality during the storage, transport and processing of food, molecular nutrition, dietary patterns and human health, etc. In food safety and quality control, the discipline will give its priority to support theoretical research on the establishment of new techniques and methods for food inspection, and the formation and control of hazardous substance during the processing and storage.

Problems existing in proposals accepted in 2015 include: (i) some proposals excessively emphasized on the technology and product development; (ii) research contents of some proposals departed from the funding scope of food science, such as some applications emphasized studies related to clinical treatment in food nutrition and food health; (iii) some of the applications did not provide authentic resume; (iv) lack of continuity for some of the applicants; (v) loose research contents, failing to concisely demonstrate their key scientific issues, etc.; (vi) some proposals were tracking up study, lack of novelty or in-depth research, for example, many applications in food nutrition and health emphasized much on active ingredients extraction, separation and primary functional evaluation of food; and (vii) some of the proposals in food inspection studied the same method applied in various fields.

The discipline will not accept proposals in the following areas: (i) health products; (ii) food technology, processing technology, food development, chemical modification and studies related to the prevention and treatment of diseases; (iii) disease prevention and treatment research with food and food ingredients; (iv) drug development; (v)

growth, development and metabolic physiological studies of plant and animals; and (vi) preclinical experimental research directly using human body.

Division VII of Life Sciences

The funding scope of the Division covers two disciplines: plant protection, and horticulture and plant nutrition.

Plant Protection

The discipline covers plant pathology, agricultural entomology, agricultural weeds, agricultural rats and other pest, plant chemical protection, biological prevention and cure, quarantine of agricultural pests, invasion biology, and biological techniques of plant protection, etc. Recently, the theory and technologies of genomics, proteomics, metabolic and molecular genetics are widely applied in the innovation of theory and techniques of pest control. However, basic research of plant protection in China is relatively weak, and especially there is a large gap between China and developed countries in the basic research on functional genomics of the interaction of important pests and crops, mechanisms of pest's virulence and crop resistance (sensitivity), law of pest disaster, production and safe utilization of new pesticides with high efficiency, low poison, and environment-friendly property, etc.

The following problems exist in the 2015 applications: (i) for some of the researches, emphasis was put on the simulation studies in the laboratory at the molecular levels, whereas more attention should have been paid to the field study and verification; (ii) quite a number of applications simply traced or imitated researches related at home and abroad, or grafted one research method (or material) to another material (or method), with a lack of original ideas; (iii) in some of the applications, the research topics were over broadly laid out, with a lack of concrete of scientific problems, and the research contents were not precise, lack of in-depth studies and substantive subject intercrossing; (iv) some of the proposals aiming at too large target with too many goals that were not achievable, as well as the lack of a deep mechanism research plan.

In 2016, the discipline will continue to encourage researches focusing on the national security of agricultural production, quality safety of agricultural products, and eco-environmental safety. Researches should focus on scientific issues concentered from practice of agricultural production, and put more emphasis on the innovation of new theory and methodology in plant conservation, and on the original creativeness of research. As for research contents, it is encouraged to carry out explorations of the reciprocity mechanisms of crop-pest-environment (biotic and abiotic) at either microscopic or macroscopic level; principles of disaster of hazardous organisms; monitoring, forecast, prevention and control of pests; and the basic and applied basic research of pesticide toxicology and its safe utilization. Special attention should be paid to new scientific issues, combining with the factors of the national crop of ecological features of different regions, to study the adjustment of industrial structure, improvement of cultivation measures, and the global climate change, etc. On the research approaches, emphasis should be put on the combination of new theory and new technologies with traditional methods, as well as integration of laboratory work with field experiment. For interdisciplinary studies, the specific aim of solving major scientific questions in the plant protection field should be elaborated. Preferential support will be given to continuous and systematic research. Excellent proposals will be prioritized funded in the field of agriculture weed, farm rats and diseases and pest forecasting of agricultural crops, etc., in order to promote the balanced

development of different branches in plant conservation.

Applications taking woods or model organisms such as Arabidopsis and Drosophila as main research objects will not be accepted. Please fill in the application code to the final level.

Horticulture and Plant Nutrition

The funding scope of this discipline covers two research subjects, namely horticulture and plant nutrition.

The funding scope of horticulture covers pomology, olericulture and fruit science, ornamental horticulture, horticultural facilities, post-harvest biology of garden crops and food mycology. In recent years, there has been a rapid development of basic research in horticulture in China. The quality and activity of research work have been much improved in the field of horticulture: the research objects have broadened and diversified, and research approach have been gradually transferred from traditional organism level and cell level to molecular level; studies based on -omics have been actively carried out in horticulture. Great achievement has been made in the study on basis of trait formation of horticulture crops, regulating measures, gene mining and function identifying, germplasm excavations and innovation, mechanisms and control of quality formation, response mechanisms to adversity, mechanisms of rootstock-scion interaction, the formation and regulation of unfavorable components of horticultural products.

The funding scope of plant nutrition covers the heredity of plant nutrition, physiology of plant nutrition, manure and fertilizer science, nutrient resources and recycling, crop-soil interaction and regulation, etc. Based on the frontier of the discipline and the national demands on agricultural resource environment, plant nutrition has been focusing its basic research on the interdisciplinary study of the plant-soil-microbe interactions, especially on root microbe-omics and regulation so as to reveal the coupling mechanism of high efficiency use of plant nutrition elements and water resources; studies on the functional genomics, genetics and physiology of plant nutrition, which are formed by the combination of plant nutrition with modern biotechnology; quantitative study in the process of soil-crop system in the combination of plant nutrition with information techniques, etc.; researches on the new theory and methodology in manure and fertilizer science; and the exploration and sublimation of modern plant nutrition theory from practice of traditional agricultural production.

In 2015, major problems in the application for horticulture were the following: (i) the research content in some of the applications was too broad and lack of the precise layout of basic technique requirement for research approach and method, indicating low level of feasibility to achieve proposed research goals; (ii) there were a large number of proposals pertaining to copying and tracing research, but only a few demonstrated original creativeness and systematic study; some applications concentrated their researches on practical problems of horticulture, but lack of sufficient scientific issues; (iii) some of the applications in the field of facility horticulture neglected the combination of facility gardening environment and its regulation with biological problems of garden crops. Main problems in the applications for plant nutrition were as follows: (i) many applications put their study emphasis on molecular biology of plant nutrition, without in-depth study on mechanisms on the physiology and genetics aspects of plant nutrition; (ii) there was a lack of substantial interdisciplinary studies among crop-soil-microbe, and in-depth study on the efficient nutrient utilization under intensification conditions; (iii) lack of basic researches on nutrient resources and fertilizing science.

In 2016, the discipline will continue to encourage endeavors on scientific issues based on national agricultural practice and agricultural industry development, with a close

combination of new approaches with traditional methods. Priority funding will be given to original, continuous and systematic and distinctive research. The discipline of horticulture will support proposals which take horticultural crops as their research objects, and address scientific problems on the features of horticulture crops, and production yield, quality, fastness, and constancy. Proposals originated from the assessment, extravagant and utilize of germplasm resources of the nation or wild garden crops will be strongly encouraged. Research on specific biological problems, such as winter dormancy of horticulture crops, flowering phase, scion interaction and organ formation and development, is especially encouraged. As for applications in facility horticultural studies, proposals should emphasize on the substantial combination of facility gardening environment and its regulation with biological problems of garden crops. Studies on the genetic, physiologic and molecular mechanisms of nutrient utilization of high efficiency, interaction between crop, soil and microbe and its control, and the coupling mechanisms of soil water and fertilizer, and its effectiveness to crops will be prioritized in funding. It is especially encouraged to apply for the experimental testification of laboratory research in the field and excellent proposals in “manure and fertilizer science”. Researches on the nutrient mechanisms of middle and trace elements will also be encouraged for an active promotion of healthy development of all branches in plant nutrition.

Applications using forest or model plant like Arabidopsis as its research objects will be not accepted by this Division. Please fill in the application code to the final level.

Division VIII of Life Sciences

The funding scope of the Division covers four disciplines: zoology; animal husbandry and grassland science; veterinary science; and aquatic science.

Zoology

Zoology studies the life phenomena and principles in animal morphology, taxonomy, physiology, behavior, ecology, evolution and genetics. The effective application of theory and techniques in molecular biology, bioinformatics, computing biology, and related subjects has greatly enriched the research contents of zoology. Studies on animal diversity, ontogeny and phylogeny, co-evolution and phenotypic evolution, animal behavior and adaptability have become cutting-edge research areas; whereas research on animal taxonomy, zoogeography and animal resource utilization, and conservation biology has been deepened and integrated continuously. Laboratory animal science has acquired more and more recognition.

Applications accepted by the discipline in recent years have demonstrated that researches in some subjects have already formed their own features and acquired significant international impact. It can be also observed that not only the formulation of scientific problems as well as rationality of designs, but also the creativeness of academic thoughts of the proposals are both greatly improved. However some problems still exist, for example, the excessive pursuit of hotspots without solid research basis, and the lack of justification for proposed research and feasibility of technical routes; insufficient experimental accumulation was provided by some of applications, or the description of detailed research progress and contents; some proposals were lack of scientific problem or hypothesis with explicit definition, or overstating research objectives; the budget for research is impractical in some proposals.

In the future, the identification and description of unknown species of animals, and

revised study of known species of animals will remain the key funding areas by the branching field of taxonomy. Taxonomy of ocean animals should also be highly valued. Key research areas currently focus on the animal phylogeny and zoogeography, as well as the life history around the evolution. The discipline will encourage researches on animal physiology, animal behavior, and the establishment of model animals, etc. Support will be strengthened for researches on conservation biology for endangered animals, the sustainable utilization of important resource animals, and related biological researches for important alien invasive species and bio-safety. **Special note to applicants: research with livestock and poultry as study objects is excluded from the funding scope of this discipline.**

Basic research of zoology for specific species in China and fragility of western and remote areas will be continually encouraged. In addition, the discipline will pay more attention to basic research on zoology; encourage original studies and exploration based on animal resources and regional features in China and the application of new theory and technologies. Interdisciplinary studies will be encouraged.

Animal Husbandry and Grassland Science

The major funding scope for animal husbandry and grassland science is to study the growth, development, feeding and breeding of domestic animals; the utilization of animal products, and grassland plant resources; quality and higher yield forage grass and the synthesized utilization of resources for maintaining pasture conditions and increasing productivity of grass and livestock.

In areas of animal husbandry and grassland science, the Division supports basic researches on resources, genetic breeding, reproduction of livestock and poultry, nutrition of monogastric animals, poultry nutrition, ruminant nutrition, feedstuff, behavior of livestock, environment and animal husbandry engineering, grassland and grazing, grass germplasm and breeding, grassland environment and disaster, forage production and processing, grassland physiology and functional genomics, sericulture and apiculture, etc.

Applications accepted and funded in 2015 covered all branches of this discipline, among which, the majority of applications focused their studies on mining excellent genes of typical excellent domestic animals of the country and their functional genome, molecular genetically breeding, reproduction and development model, molecular mechanisms of regulation, new theory and methods related to molecular nutrition, and the development of fine grass germplasm resources and fine variety cultivation, the livestock of low emission, and the interaction of animal husbandry development and its environment. Quite a few studies in the above fields have formed their features in many aspects. Moreover, researchers started to pay close attention to international and domestic cooperation and exchange, and endeavors have been put to the research which may acquire independent intellectual property rights.

In 2016, the discipline will give more priority to studies on excellent gene mining of typical livestock, poultry, grass, silkworm and bees of China, and cultivation of fine species; encourage basic research on nutrition of domestic animals, prolificacy of live stocks, and the genetic breeding of grazing; and the high efficiency utilization of feedstuff and forage resources. The discipline will also give moderate preference to researches on the environment of domestic animals and pollution, behavior and welfare, mechanisms of the physiological adaptation of productivity, and grassland pasture, sericulture and apiculture, etc.

Special notes for applicants are the following: (i) study object of the research should be livestock, poultry, grass, silkworm, or bee; interdisciplinary studies with other subjects are not allowed to depart from the main research aspect above; otherwise the proposal will be not funded; (ii) for research topic selection, please grasp

the essence of key scientific issues in related fields, instead of simply following up the new research progress at home and abroad; (iii) please fill in the application code to the final level.

Veterinary Science

Veterinary science is to study the occurrence, development, diagnosis, prevention and cure of animal diseases. The discipline covers the following branching: animal diseases, zoonoses, public hygiene, laboratory animals, veterinary medicinal industry, etc., as well as other related novel interdisciplinary research areas.

The discipline supports basic researches taking animal diseases as major objects on animal infectious diseases, zoonoses, most common diseases and comparative medicine. The funding scope covers: basic veterinary science, animal (veterinary) pathology, veterinary immunology, veterinary parasitology, veterinary epidemiology, traditional Chinese veterinary, veterinary pharmacology and toxicology, and clinical veterinary science.

Proposals accepted and funded in 2015 covered all subjects of this discipline. Among them, the majority of applications were focused on veterinary epidemiology, basic veterinary, clinical veterinary and veterinary immunology. Some of them were able to aim at the international frontiers, highlight the creativeness in the selection of their research themes, and actively prompt to the international standard of research work. However, problems still existed as demonstrated here: some of the applications paid much attention on the international hotspot, but were lacking of enough concentration of scientific issues; basic research on topics such as traditional Chinese veterinary, animal (veterinary) pathology, etc., were yet to be concerned.

The discipline will continue to encourage studies on the epidemiology, pathogenic biology, mechanisms of pathogenic infection and immunity about important animal epidemic diseases and zoonoses, meanwhile, strengthen researches on the basic veterinary immunology, the non-infectious disease of animal mass populations, food safety of animal source, and related research, and give moderate preferential support to studies on traditional Chinese veterinary, and animal (veterinary) pathology, etc.

In 2016, the discipline requests applicants to take animal diseases as their main research objects and interdisciplinary studies should not deviate from the research objects. Otherwise the applications will be not funded in the discipline of veterinary science. Studies with mouse, rat as model system should serve to solve veterinary scientific questions.

Aquatic Science

Aquatic science is to study basic rules of the development, growth, breeding, genetics, physiology and immunology of aquatic organisms and their breeding ecology, breeding engineering, nutrition and foodstuff, control of diseases and pests, and the protection and utilization of aquatic resources, etc.

The main funding scope in this discipline covers basic aquatic biology, the genetic breeding of aquatic organisms, aquatic resources and conservation, the nutrition and feed science of aquatic organisms, aquatic breeding, the immunology and control of diseases and pests, breeding and fishery engineering, and new techniques and methods of aquatic biological research.

In 2015, most of proposals accepted and funded were in areas of immunity and control of diseases and pests of aquatic organisms, aquatic basic biology, genetic breeding of aquatic organisms, as well as aquatic resources and conservation, etc. Relatively in-depth

studies were conducted on important economic traits of aquatic animals, molecular characters of important pathogens and their pathogenesis, etc., and some of studies have formed their own research features and superiority in some aspects. It can be seen from peer review and panel meetings that the creativeness of academic thoughts of proposals were obviously improved. However, only a small portion of applications were able to propose original research on the important scientific issues of aquaculture, whereas for most of the studies, concentration of specific scientific issues was yet to be improved.

In 2016, the discipline will request applicants to focus their studies on research fields of aquatic science, and aim at the frontier and important demands of production. The interdisciplinary study on aquaculture subjectively with other disciplines will be encouraged. It will be strengthened to support proposals with original ideas. Applicants should choose topics based on new development of subjects concerned at home and abroad, and their research background, aim at scientific problems, focus on original innovation, and avoid over emphasizing on R&D for technology while lacking of key scientific issues. Research on model organisms should be based on aquaculture science. The discipline will encourage cooperation of applicants with superior units and teams, so as to fully exert regional and resource priority, and enforce cultivation of talents. The Division will prioritize applications in the following areas: genetic rules and gene function of economic traits of important breeding organisms; epidemiology and pathogenesis of important aquatic organisms; host immunity and diseases prevention and treatment; molecular basis and regulation mechanisms of breeding and development of important aquatic organisms; regulation mechanisms of the utilization as well as metabolism of nutrient stuffs for aquatic animals. Moderate support will be provided in the following areas: basic research of aquatic breeding and interaction with eco-environment, conservation of aquatic resource, new model and new techniques of breeding, etc.

Department of Earth Sciences

Earth sciences study the origin and evolution of the planet earth system. The earth sciences include geography, geology, geochemistry, geophysics and space physics, atmospheric and oceanic sciences, as well as the interdisciplinary research among these disciplines and other fields.

The above sub-disciplines of earth science are the core and basic factor for the progress of earth science. The General Program is aiming to promote the balanced and harmonized development for all disciplines of earth science, facilitate original innovation and expend the frontier of research, and hence to build up a robust basis for the development of the earth science.

In 2015, the Department received 5,792 proposals for the General Program submitted from 688 institutions. Among them, 1,554 were funded with a total budget of 1.0923 billion yuan (direct expenses, and hereinafter), with a success rate of 26.83% and an average budget of 702,900 yuan for individual project. Among the funded projects from the General Program in 2015, 877 (56.4%) were from universities and 648 (41.7%) from research institutes. The PIs of 1,023 projects (65.8%) were younger than 45 years old. There were 134 interdepartmental and interdisciplinary projects, and the proportion of interdisciplinary projects supported by different divisions inside the Department of Earth Sciences is even higher. Small Fund for Exploratory Studies with 1-year research is set up for highly exploratory, innovative and high risk projects or projects with uncertainty. Altogether, 9 proposals were approved as the Small Fund for Exploratory Studies projects in 2015 and 1.78 million yuan were allocated.

The criteria for the selection of General Program projects in 2016 are still as follows:

- (1) Innovation and academic value of the overall research approach;
- (2) Research capability of the applicants;
- (3) Clear stated scientific issues and well defined ideas;
- (4) Availability of necessary research basis and conditions.

During the selection of the proposals, the Department pay close attention to the importance of the basic or traditional disciplines, maintain the international status of the privileged discipline or fields in China, promote the disciplines which are still weak or even “endangered” in China yet predominant in the world, encourage the intercrossing, integration, infiltration and synthesis among disciplines, improve the development of the frontier and basic sub-disciplines, foster the development of the sub-disciplines closely related to experiment, observation, data integration and simulation, and recognize the importance of the intercrossing of the earth science and other disciplines.

While advocating innovations, the accumulation of research work should be emphasized. Under the same condition, preferential support will be given to those applicants who have a good accumulation of previous studies and high-quality results obtained from their recent completed projects, as well as who apply to continue their studies. Applicants are required to address the relation between the proposed research work and their accomplished projects. In regard to the exploratory, unforeseeable and long-term running for basic research, special attention will be paid to the high risk, interdisciplinary and frontier research. Scientists will be encouraged to face the great challenging scientific issues and to carry out risky and exploratory research. The intensity of individual grants will be constant to the previous years in 2015. Average budget for individual project will be 600,000 yuan to 1,500,000 yuan for 4 years.

Funding for General Program Projects in Department of Earth Sciences in 2015

Unit: 10,000 yuan

Divisions		Projects	Average funding for direct costs	Funding rate++ (%)
Division I	Geography (including soil science and remote sensing)	524+3*	35,000	24.10
Division II	Geology	360+2*	26,844	29.03
	Geochemistry	137+1*	10,048	28.11
Division III	Geophysics and space physics	180+1*	12,980	29.34
Division IV	Marine science	189+1*	13,365	25.78
Division V	Atmospheric science	155+1*	10,993	30.41
Total		15495+9*	109,230	26.83
Average funding per project		70.29 (70.58**)		

Notes: *The number of projects of Small Fund for Exploratory Studies for 1 year

**Average amount for individual projects with a full term (not including Small Fund for Exploratory Studies projects);

++ Funding rates include the projects of Small Funds for Exploratory Studies.

Division I of Earth Sciences

The funding scopes of the Division I include Physical Geography, Human Geography, Soil Science, Remote Sensing and Geographic Information System, and Environmental Geography.

The main research areas funded by the Division I are aiming at the understanding of evolution processes, spatial heterogeneity and interaction mechanisms of natural and human

elements in the terrestrial surface system. Physical Geography focuses mainly on interactions, spatial heterogeneity and evolution processes of modern natural environmental elements at multiple tempo-spatial scales, and concerns the human-land relationship since the Quaternary Period, especially Holocene. Human Geography concentrates mainly on the different types of modern human elements, spatial structure and evolution processes of their information carrier, and concerns natural background, historical development and human mechanism of regional human elements' spatial structure formation. Soil Science is an independent discipline for the understanding of pedogenic processes and spatial distribution, soil physical compositions and characteristics, and spatiotemporal evolution processes of soil functions. It emphasizes on the physical, chemical and biological mechanisms about the changes of soil quality and soil function caused by excessive human utilization. Geographic Information Science (Remote Sensing and Geographic Information System) is a discipline of acquiring, processing, analyzing, presenting, transmitting, memorizing and managing geographic tempo-spatial information of terrestrial surface assisted by the modern technologies of remote sensing (RS), geographic information system (GIS) and global position system (GPS), especially concerns the study on geographic information interpreting. Environmental Geography focuses mainly on environmental pollution, ecosystem conservation and restoration, natural hazards and risk, and resource utilization and management, which concerns about the negative effects on human living and development space by human activities, and analyzes the interactions of human and environment, mechanisms and strategies of the sustainable development. It should be reminded that technology research and development, production technique, product development related to solar energy, wind energy, biological energy and water treatment, etc., are out of the funding system of the Division I.

In 2015, the Division I received 2,187 applications for General Program, among which 527 projects including 3 projects of the Small Funds for Exploratory Studies were aided financially with a direct fund of 666,800 yuan averagely per application (not including the Small Funds for Exploratory Studies). The research fields of these funded projects were categorized into Physical Geography (including D0101, D0103 and D0104) with 144 projects, Human Geography (D0102) with 60 projects, Soil Science (D0105) with 118 projects, Geographic Information Science (D0106, D0107, D0108) with 121 projects, and Environmental Geography (D0109, D0110, D0111, D0112) with 84 projects.

In 2016, a standardized selection of “application code”, “research field” and “key words” will be tried out continuously in Division I. When filling out the application forms, applicants should visit the “special focus” under the item of “application acceptance” on the official home page of the NSFC (<http://www.nsf.gov.cn/>), and read carefully the “list of application code, research field and key words (D01 and subordinate codes)” and make sure their applications in accordance with the funding areas of Division I.

Division II of Earth Sciences

The funding areas of the Division II include geology, geochemistry and environmental geology.

Geology (Including Environmental Geology)

Geology (including environmental geology) is the knowledge system about the composition, structure and evolution of the solid Earth. The aim of modern geology is not only to elucidate the structure, the material composition and the mechanism controlling the transition of materials of the solid Earth, as well as the history of the environment and life

evolution recorded by these materials, but also to reveal the agents and processes which modify the surface of the Earth. The knowledge of geology can also be applied to explore the utilizable energy, water and mineral resources, to disclose the relationship between geological processes, life evolution and human activities, and to protect the earth environment and mitigate geo-hazard.

The development of geology is based on the progress of the fundamental theory and cutting-edge technology. The introduction of plate tectonic theory has brought about revolutionary changes to the understanding of the Earth. The complexity of the continental dynamics, especially the periodical convergence and dispersion of the continents and supercontinents, is further raising new themes for the advancement of plate tectonic theory. The development of mantle plume theory and geo-fluid in recent years has closely linked the deep activities together with surface phenomena of the solid Earth. The enhancement of abilities to obtain and analyze data has become a major driving force to promote the development of geological science. The improvement of instrumentation, such as high precision, in-situ and real-time analysis of the terrestrial materials has enhanced the ability to determine the composition and evolution for the earth's specimen. The utilization of seismological technology, remote sensing technology and satellite observation of the Earth has deepened the understanding of the structure of the Earth. GIS, GPS and RS technologies have improved the quality of geological mapping and are realizing the real time monitoring of plate motion, earthquake and volcanic activities. Computer simulation has made possible for the analysis, simulation and predication of important geological processes. Crusts drilling techniques, deep-earth detection and high-temperature-pressure experimental technologies have also greatly promoted the development of geology.

Profound changes have taken place in the research subjects, models and methodologies of geological science owing to the emerging new framework of earth system science and the strong demand for the sustainable social and economic development. The concept and rationale of multi-sphere interactions and interface processes have been strengthened in the geological science. The role of geology has evolved from its traditional function of disclosing the records of the Earth's history to the prediction of the Earth's future environment, due to the accumulation of improving capability to obtain critical data. The theory on the formation and exploration of the mineral resources and fossil energy, the environmental changes under the intervention of human activities, as well as the mitigation of geological hazards have been major challenges to geologists. New interdisciplinary fields, such as geo-biology, are developing fast due to the close correlations between geological science and life science established by the discovery of the critical role of life activities in the geological processes. With the development of the deep space exploration in China, more attention will be paid to the research of composition, physical property, structure, origin and evolution of the near-Earth planet and its correlation with the Earth.

The geological program encourages characterized proposals of basic research on fundamental theory based on field and site observations by using of the abundant materials and data recently acquired and accumulated by the geology-related agencies and institutions. Multidisciplinary approaches, such as the application of the concept, theory, technology and methodology of mathematics, physics, chemistry as well as biosciences, are encouraged to study geological issues. International collaboration, which may combine the privileged local geological features, is encouraged to promote the progress of geological theories with global scientific views. Young scientists are encouraged to submit proposals to benefit their research career.

In 2015, 1,247 proposals for General Program projects were received and 362 were funded with a success rate of 29.03% and an average direct expense of 741,500 yuan per project. The distribution pattern of the funded projects among main research fields is as

follows: projects in areas of paleontology, stratigraphy and sedimentology account for 14.7% of the total funds, projects in areas of mineralogy, petrology, volcanology, economic geology and geo-mathematics for 17.9%, projects in areas of petroleum geology and coal geology for 12.5%, projects in areas of structural geology, Precambrian geology and regional geology for 12.0%, projects in areas of Quaternary geology and environmental geology for 13.1%, and projects in areas of hydrogeology and geo-engineering for about 29.8%.

The predominant defects in the applications in 2015 are as follows: The proposed topic is too broad to be supported by the General Program, the raised arguments fail to focus on the scientific frontier or are poorly addressed, the research activities fail to state the scientific significance clearly and thus could not demonstrate the necessity to be carried out, as well as key issues to be attacked are vague due to defectively designed scientific and technological approaches. In some proposals, the description of research methods and technological outlines is very general and there is a lack of essential feasibility on key approaches.

Geochemistry

Geochemistry is the discipline that investigates the chemical composition, chemical process and chemical evolution of the epigeosphere and earth interior. Also, it involves cosmochemistry and comparative planetology. It applies primarily to analysis of elements and isotopes, observation of macroscopic and microscopic structure, isotope and chemical dating, molecular organic geochemical tracer method, biological geochemical process analysis, etc. Geochemistry focuses mainly on substances evolution and interaction of different geosphere in the Earth's history. Also, it emphasizes the source, distribution, migration, transformation, cycle and fate of chemical elements and substances of the earth surface system under human activities stress, and these impact mechanisms on ecosystem.

The characteristics of modern geochemical studies include as follows:

- (1) In the solid geochemistry field, the research hotspots have shifted from the material composition and chemical reactions of the interior Earth to the interactions of different geospheres and their boundaries. It gives full play to advantages of geochemical microprobe in situ analysis with high-resolution, high-precision and high-sensitivity. It pays more attention to geochemical processes and composition structure of Earth's layers. It emphasizes the integration of plate tectonics evolution and global change research.
- (2) In the research of earth environment changes, supergenesis and environment pollution process, it attaches importance to the superimposed effect of natural processes and human activities, and to the coupling mechanism of chemical and biological effect. It pays close attention to source apportionment and process tracing and their influence on ecosystem and climate change. The environmental geochemical and biogeochemical processes of the Earth's surface system have become an important geochemical research field.
- (3) Research methods and techniques have shifted from statically semi-quantitative description to dynamically quantitative simulation, focusing more on the research of four-dimensional space-time evolution.
- (4) It pays attention not only to the reconstruction of ancient geologic events on long time scales, but also to the description of physical, chemical and biological processes on short time scales, and the prediction and simulation of environment changes in the future.

The funding policy of this field is listed as follows: (i) to promote coordinated development of different branches of geochemistry; (ii) to encourage the studies on the

fundamental theory, the development of experimental analysis technology, and the establishment and improvement of geochemical model; (iii) to broadly support the frontier fields of geosciences such as the evolution of the Earth and other planets, the environmental evolution and vital processes on earth, the changes and protection of ecological environment; (iv) to concentrate on the basic research about the formation mechanism and detection methods for mineral resources and fossil energy, the evolution and regulation of water-soil resources, and the prevention and treatment of as well as natural disasters energy, water, and mineral resources; and (v) to encourage interdisciplinary research of environmental sciences, life sciences and other disciplines of geosciences with geochemical theory and method.

In 2015, 491 and 487 proposals for General Program projects were received and accepted, respectively. The average annual funding rate (including the Small Fund for Exploratory Study) is 28.11%. The average monetary funding level (excluding the Small Fund for Exploratory Study projects) is 732,000 yuan per project. The percentages of proposals and funded projects of different research fields are as follows: 7.9% and 9.4% for isotope geochemistry, 2.0% and 2.2% for trace element geochemistry, 7.9% and 11.6% for petro geochemistry, 7.9% and 8.7% for ore deposit geochemistry and organic geochemistry, 4.0% and 5.1% for isotopic and chemical geochronology, 3.3% and 2.2% for experimental geochemistry and computational geochemistry, 2.0% and 4.3% for cosmochemistry and comparative planetology, 20.0% and 16.7% for biogeochemistry, 44.9% and 39.9% for environmental geochemistry. In recent years, the quantities of the accepted proposals in environmental geochemistry and biogeochemistry fields have become the largest. The percentages of proposals and funded projects in these research fields are 64.9% and 24.5%. The percentage of funded projects in other seven research fields is 34.7%.

The main insufficiencies of accepted proposals in the past are as follows: (i) it is emphasized only on the importance of research field, but fails to clarify the creative scientific issues; (ii) it is unable to indicate literature view comprehensively and fully, only to elaborate literature supporting its own academic viewpoints; (iii) the research approach, perspective and methodology are uncreative and indistinctive; innovation of the research is exaggerated excessively; (iv) the research aims and contents are too large and too many to realize during the supporting period and by the financial support. These problems are very apparent in proposals for Young Scientists Fund of the National Natural Science Foundation of China. The key methods and technology related to the success or failure of the project are lack of specific and detailed feasibility discussions.

Division III of Earth Sciences

The funding areas of the Division III include geophysics, space physics and geodesy.

Geophysics

Geophysics, which includes direct observation and theoretical studies on the basic physical fields of the earth and planets, for instance, seismic, gravity, magnetic field, electric field, stress field, heat flow, etc., is not only essential for effectively understanding of internal structures of the earth and planets and their components and dynamic processes, but also the foundation of new methods and technology development of resource exploration. Moreover, explorative study on mechanism of earthquake and other natural disasters has important significance for protecting the earth and disaster alleviation.

Space Physics

Rapid progress in space physics has been made in recent years, especially in multi-level energy transferring and coupling, and the comprehensive theory framework of the disturbance of solar-terrestrial system. In addition, studies on the interaction between the solar wind and the atmosphere of the moon and planets are also initialized. This progress provides a foundation for rapid development of space weather. Proposals dealing with scientific issues in these fields are encouraged.

Geodesy

In recent years, aeronautics, astronautics and geodesy have witnessed rapid development due to significant improvement of the precision and spatial resolution of observation and relevant theories of data-processing, and thus have become one of the most important branches of geophysics. Researches based on such development, including the development of the ground- and space-based observation system and theories, are encouraged to understand the shape and gravity of the earth, the crustal deformation field and its changes which provide space, time and gravity datum for the national defense.

Geophysics, including solid-earth geophysics, space physics and geodesy, utilizes the theories and methodologies of physics and mathematics to understand the earth and the solar-terra space as well as the corresponding physical processes. These studies play an important role in solving the emergent problems of resources, environment and natural hazards for the sustainable development of the society.

In 2015, 617 proposals for General Program in geophysics and space physics were received and 181 of them were funded with a success rate of 29.34% and an average funding of 717,100 yuan per project. In addition, 1 project of Small Fund for Exploratory Studies was funded with funding of 200,000 yuan. The funding is distributed in the following major research areas: geodesy (20.99%), solid-earth geophysics (31.49%), exploration geophysics (23.21%), space physics (22.10%) and experiment and facilities (2.21%).

In recent years, the Division awarded more innovative projects, which results in fruitful achievements. In the near future, encouragement for innovative ideas and cultivating team leaders will be continued as the major task of the Division. Besides continuous support to fundamental research, more efforts will also be given to new growth and pioneering studies, specifically those regarding to breakthroughs of well-defined scientific issues. Support will be focused on frontiers of space weather, satellite gravity, environmental geophysics, experimental geophysics, geophysics of the earth's deep interior, and comparative studies of the earth and other planets, as well as the theory of seismic wave propagation. Special attention will be given to the application of new technology, innovative tools and especially new observational data to the study of geophysical and space systems.

Division IV of Earth Sciences

The primary funding areas of the Division IV include marine science and polar science.

Marine Science

Marine science is a discipline studying sea water and seabed, and various processes at interfaces between ocean and atmosphere, and between sea water and coastal estuaries, including physical oceanography, marine geology and geophysics, marine chemistry, biological oceanography, marine environmental science, coastal estuaries, marine

engineering, marine monitoring and survey techniques, marine remote sensing, integrated coastal zone management and other branches. Basic sciences, such as mathematics, mechanics, physics, chemistry and biology have been continuously applied to marine science. Meanwhile, new and high technologies, such as space technology, information technology, biotechnology and deep-diving technology, have been continuously applied to marine science. These have opened a new frontier in marine science. Research within this new frontier is also encouraged by the Division.

Marine science is a comprehensive research, characterized by the accumulation of observational and experimental data, the application of new and high technologies, the development of simulation models, and the tendency towards globalization and internationalization. The advance of marine science can make social and economic development achieve sustained benefits from ocean resources, which is an important measure of national scientific and technological strength. The current strategic position of marine science has been leveled up greatly with a tendency toward “global change” and “deep-sea research”, forming a new pattern extending from the shore to the interior ocean and from the shallow water to the deep ocean.

Marine science is a science essentially based on observation. The promotion of its academic thoughts and research abilities depends on long-term observation and data accumulation. To meet the demands of research projects in ocean observation, NSFC initiated the pilot Ship-time Sharing Project. Scientists are encouraged to participate in the NSFC Open Research Cruise (NORC) to obtain more continuous, systematic and comprehensive data. The program aims at encouraging scientists to conduct in-situ observation and laboratory analysis using new technologies and methods focused on the scientific issues to be investigated, and provide technical support for exploiting new research fields and new results. In order to promote a balanced development of marine science in China, it is also encouraged that scientists may join in existing cruise plans carried out by other agencies to do research on the deep ocean.

For those who want to participate in the NORC, it is required to describe the necessity, contents and expected data outputs of the proposed observations in the proposal. Applicants are suggested to pay close attention to the related bulletin and announcements for cruise timing.

In 2015, 737 proposals for marine science were received and 190 proposals were funded. The total funding amounts to 133.65 million yuan. The success rate is 25.78% and the average support is 703,400 yuan per project. Similar to the past few years, most proposals are focused on biological oceanography, environmental oceanography, marine geology and physical oceanography, which together account for approximately two-thirds of the total submitted and funded proposals. The number of funded proposals has little change in the fields of marine chemistry, estuarine and coastal research, ocean engineering, marine monitoring and investigation, and marine remote sensing. However, the number of proposal in marine physics, which is an important funding direction in marine science including acoustics, optics and electromagnetic, were relatively small and hence the least share of funding was awarded.

There are some basic elements to support a successful proposal, including scientific innovation, appropriate scientific objectives and research scope and feasible scheme. One or more absences of the above elements may lead to a failure. Among them, the scientific innovation is the most decisive. For the Young Scientists Fund applications, some frequent defects come from too broad scope and lack of research focus.

Polar Science

Polar science is a discipline studying various natural phenomena, including the

processes and changing rules peculiarly in polar region as well as its interaction with other components of the Earth system. It is a comprehensive discipline consisting of several sub-disciplines including polar biology and ecology, polar oceanography, polar space physics, polar atmosphere science and climatology, polar geology, geophysics and geochemistry, Antarctic astrolithology, polar glaciology, polar mapping and remote sensing science, polar management and information science, polar observation and engineering technology, etc. For the past few years, significant progress has been achieved in international polar research. However, it is still the weakest area in earth science. Comprehensive and interdisciplinary study is the current trend in polar science, which is focused on the key scientific issues on global change and sustainable development for carrying out research on large-scale interactions of the five spheres in the polar region as well as their interactions with the middle and low latitudes. Polar science in China should develop research by focusing on key scientific issues such as global change and sustainable development based on the accumulation of existing research.

In 2015, 41 proposals on polar science were received and 13 were funded, with a success rate of 31.71%.

Division V of Earth Sciences

The primary funding areas of the Division V include meteorology, atmospheric physics, atmospheric environment and atmospheric chemistry.

Atmospheric science is to study various phenomena and their changing regulations occurring in the atmosphere so as to serve the mankind. In recent years, with the introduction of the Earth system science and sphere interaction concepts, atmospheric science enters a new historical phase of development. The atmosphere is one of the most active spheres in the Earth system. Its changes are affected and controlled by other spheres in the system and celestial bodies such as the Sun; at the same time the response of the atmosphere to the changes simultaneously results in direct impact on the ocean, terrestrial surface, ice and snow, as well as the ecosystem on the Earth. The atmosphere plays an important role in the interaction among different spheres of the Earth system, and regulates the whole behavior of the Earth system with the interaction of other spheres. Therefore, beside the study of dynamical-physical-chemical process within the atmosphere, atmospheric science currently focuses on the comprehensive researches on the essence of the atmospheric change in terms of the interaction among hydrosphere, lithosphere, cryosphere, biosphere, human activities and global climate, the regulation of climate system and theories and methods of climate change prediction the impact of human activities on weather, climate and environment system, and the influence of weather, climate and environment system change on human society. Atmospheric science deepens the study on its various sub-directions, and meanwhile, pays attention to the mechanism of the disastrous events occurrence and development of the weather, climate and environment, as well as the forecast and prediction; study on issues of global climate and environment change, and its impacts, adaptation and mitigation; the comprehensive, integrated, modeling and systematical studies on various processes; the interdisciplinary study which could provide the scientific basis for the livelihood and the sustainable development of society

In 2015, the Division received 513 proposals for the General Program and 156 projects were funded with the success rate of 30.41% and the average funding intensity of 704,700 yuan per project, including 1 project for the Small Fund for Exploratory Study with 200,000 yuan per project.

In 2016, the Division will continually encourage proposals for exploratory and original

basic studies in areas as follows: (i) the various phenomena, processes and mechanism in atmosphere, and the physical-chemical-biological processes of the substance and energy interaction between the atmosphere and other spheres by applying new ideas, methods, advanced equipment and technologies in fields of mathematics, physics, chemistry, biology and information science; (ii) applications regarding to disastrous weather, atmospheric dynamics, atmospheric physics, atmospheric chemistry, atmospheric environment, atmospheric detection and remote sensing, stratosphere and mesosphere, geophysical fluid dynamics and boundary layer turbulence; (iii) the climatic change and its relevant extreme synoptic and climatic events; (iv) new theories and methods for weather forecasting and climate prediction; (v) applied research on the data received by satellite remote sensing and other sources; (vi) analysis and applied research on the data received from the large scientific experiments and science plans being initiated, conducted or already completed, as well as large observation network established in China and aboard; (vii) research on the principle and method for meteorological observation, data analysis and applications; (viii) the interdisciplinary research of the atmospheric science and the field of the livelihood and the sustainable development of society (agriculture, energy, transportation, forestry, hydrology, health, economy, and ecology, etc.).

Department of Engineering and Materials Sciences

Engineering and materials sciences provide necessary and significant S&T knowledge for the assurance of national security, the improvement of people's living standard and the sustainable development of the society and economy. Aiming at cutting-edge areas and meeting the national strategic demands of the social and economic development as well, and committed to discoveries, inventions and innovations concerned, researches in engineering and materials sciences should pay full attention to scientific creativity and innovation, especially original creativity and innovation with independent intellectual properties, so as to achieve a higher level of sustainable development in the field of engineering and materials.

The Department will continue to support interdisciplinary and cutting-edge researches, especially the researches with such great significance that new knowledge could be formed, industrial development could be promoted and international competitiveness could be raised. Researchers are encouraged to focus on original and integrated innovation and to pay more attention to key scientific issues coming from application and propose related research contents. Priority is given to the researches that can lead the development of disciplines, and have the potential to form independent intellectual properties, especially those suitable for national conditions.

In 2015, the Department received 13,911 proposals (300 rejected), increased by 30.87% in comparison with that in 2014, and among them, 2,794 were supported with a total direct cost of 1,772.70 million yuan. The average direct funding is 634,500 yuan per project and the success rate is 20.08% (23.28% in 2014).

Applicants should pay full attention to the following points:

- (1) The Department will support preferentially basic research with scientific merits and applicable prospects, with considerations to practical conditions and resource characteristics of China, which can either give an impetus to the development of relevant sciences or lead to independent intellectual properties. Proposals that meet

the needs of national economy and sustainable development of the society will be encouraged.

- (2) Interdisciplinary researches will be encouraged so as to promote the progress of the cross disciplines involved. Applicants should put forward new conceptions and ideas as creative as possible with specific scientific issues.
- (3) The fundamentality and innovation should be fully discussed in proposals. Applicants should pay attention to proposing key scientific issues, concentrating research contents and highlighting research focus.
- (4) When applicable, applicants are required to provide the research achievements of the last completed project, and list the scientific papers published in domestic or foreign academic journals. The provided information must be objective and accurate; otherwise it will affect where the application is going.

**Funding for the General Program Projects
in the Department of Engineering and Materials Sciences in 2015**

Unit: 10,000 yuan

Divisions		Projects	Average funding for direct costs	Funding rate (%)
Materials sciences I	Metallic materials	214	13,743	20.56
Materials sciences II	Inorganic and non-metallic materials	303	19,388	20.29
	Polymer materials	217	13,852	20.55
Engineering sciences I	Metallurgy and mining science	296	18,983	19.71
Engineering sciences II	Mechanical engineering	545	34,442	20.46
Engineering sciences III	Engineering thermo physics and energy utilization	215	13,746	20.69
Engineering sciences IV	Architecture, environmental and structural engineering	560	35,040	19.69
Engineering sciences V	Electrical science and engineering	191	12,078	19.69
	Hydrology and marine engineering	253	15,998	19.43
Total		2,794	177,270	20.08
Average direct funding per project		63.45		

Division I of Materials Sciences

The Division supports fundamental research on metallic materials. Research proposals should present the merits of the proposed fundamental research clearly, including clear objectives and scientific significance of the project, and the suitability of the methods to be employed. Proposals should target either to advance the materials science in cutting-edge areas or to promote development in the relevant areas that meet the national demands.

The funding spectrum of the Division covers compositions, microstructures, phases, surfaces and interfaces, scales effect, impurities and defects in metals, alloys, metal matrix composites, intermetallic compounds and metal-like materials, and their influence on mechanical, physical and chemical properties and performance; basic issues in the preparation and processing of metallic materials, including heat treatment, casting, forging, welding and cutting; basic issues in the strengthening and toughening, deformation and

fracture, phase transformation and alloy design; fundamentals in energy materials, environment-friendly materials, biomaterials, and materials in transportation, aeronautic and astronautic industries; interaction mechanisms of metallic materials and environment, damage, functional degradation and consequent failure mechanism, recycling mechanism and relevant fundamentals; theoretical fundamentals on metallic materials; development of theoretical methods, calculating methods, modern analysis and test methods, big data analysis and processing methods incorporating basic and applied basic researches of metallic materials.

In 2015, the Division received 1,041 proposals for the General Program, increased by 30.45% in comparison with that in 2014. Totally, 214 projects were granted with an average funding intensity of 642,200 yuan per project and a success rate of 20.56%.

It is noticed that the areas of metastable metals and alloys, functional materials and surface engineering kept the leading place in term of the amount of proposals. It is hoped that researchers should pay attention not only to the frontiers and the hot areas, but also to other fundamental issues with scientific merits and creative ideas, especially those common key issues beyond materials systems. In addition, some attention should be paid to the new understanding of classical issues in basic materials. Applications in the field of composites and surface engineering should focus on scientific aspects and proposing unique ideas. Applications with a cross-disciplinary background should focus on issues within the funding spectrum of the Division.

The Division would give more financial support to the selected areas that meet the national demands or is expected to achieve a breakthrough in the form of General Program project groups. In 2016, the following research orientations will be given preferential financing: (i) microstructure and defect control in the process of preparation and processing of high performance aluminum materials used in major projects; (ii) optimization design principle of multi-dimension, multi-scale and multi-architecture structural composite materials and their preparation methods.

Division II of Materials Sciences

The Division mainly supports fundamental researches on inorganic non-metallic and organic polymer materials.

Inorganic Non-Metallic Materials

The Division supports the fundamental and applied basic researches on various inorganic non-metallic materials. Along with the development of material design theories and the innovation in fabrication technologies, lots of new inorganic non-metallic materials have been invented, including high-temperature superconducting ceramics, smart materials, biomaterials, energy materials and nano-materials, etc., which have greatly stimulated the researches in the related areas. At present, researches on inorganic non-metallic materials, functional materials are developed towards high efficiency, high reliability, high sensitivity, smartness and functional integration; and structural materials tend to possess compositization, high toughness, specific strength, high wear-resistance, high corrosion-resistance, high-temperature endurance, low cost and high reliability. Meanwhile, conventional materials are being remolded, upgraded and developed as well. More and more attention is given to the applications of inorganic non-metallic materials in

information technologies, life science, energy and environmental science, etc.

In 2015, the Division received 1,493 applications for the General Program, with an increase of 21.88% compared with that in 2014, and 303 projects were funded with an average funding intensity of 639,900 yuan per project and a success rate of 20.29%.

Looking at the proposals submitted in the past three years, it is noted that with the increase of applications the researches involve various areas with broad interdisciplinary range. In 2015, researches on functional materials accounted for 56.48% of the total, which is still an active field. These applications presented many innovative ideas and induced the hotspots of various areas including nano-materials, ferroelectric and piezoelectric materials, carbon and super-hard materials, photoelectric information functional materials, composite materials and photo-catalysis materials and so on. Among them, applications regarding photoelectric information functional materials (accounted for about 18.8% of the total in 2015) ranked above all the others in recent years. There were also many applications regarding new energy materials, display materials, biomedical materials, in which the creativity needs to be further improved. The applications regarding structural ceramics accounted for 5.12% of the total and were relatively concentrated among a few institutions, and relevant researches significantly went towards the direction of high-toughness, easy processing ability, high reliability and low cost fabrication by new techniques. A fairly large number of proposals for inorganic non-metallic composites were also received, among which proposals on functional composite materials increased a bit more than before. However, in term of the quality, quite a number of them can be classified as follow-up, low level repetition, and lack of innovation and basic issues of inorganic non-metallic materials. The Division will support the researches with creative and innovative ideas, and interdisciplinary researches of inorganic non-metallic materials cross-cutting with other related fields.

The Division encourages and supports synthetic methodology and related applied basic researches in novel inorganic non-metallic functional information materials based on domestic resources; researches on low-dimensional and nano-materials, including new fabrication techniques, property characterizations, novel effects and the related physical and chemical issues; materials with external field induced phase transition and the related basic aspects; the surface, interface, connectivity and compatibility of composite materials; gradient functional materials and in-situ composite materials; “structure-function” integrated composite materials, synthetic techniques for high-performance, low-cost and high-reliability materials; the composition, structure, performance and characterization on smart materials, new energy materials, biomedical materials and eco-environmental materials; theoretical fundamentals on the design and corresponding fabrication techniques for inorganic non-metallic materials (in macro-, meso- and micro-scales, respectively); and the improvement and remolding of conventional inorganic non-metallic materials using new theories and techniques or new processes.

Organic Polymer Materials

The Division mainly supports the following areas in the field of organic and polymeric materials science: preparation chemistry of polymeric materials; theory and method for the characterization of polymeric materials; processing of polymeric materials; the surface and interface of polymeric materials; the implementation of the high performance and functional properties of general polymer materials; polymer-based composite materials; functional

organic and polymeric materials and organic solid materials; biomedical polymer materials; organic and polymeric materials related to energy, transport, ecological environment and resource utilization; smart and biomimetic polymer materials; special polymer materials.

In 2015, the Division received 1056 proposals for the General Program, with an increase of 36.25% compared with that in 2014. Finally, 217 applications were granted with an average funding intensity of 638,300 yuan per project and a success rate of 20.55%. Quite many of the applications were involved in the following areas: biomedical polymer materials, polymer blend and composite materials, functional inorganic/organic composite materials, structure-property relationships of polymeric materials, and opto-electronic functional materials, etc.

The Division encourages interdisciplinary basic researches involved with mathematics, chemistry, physics, life science, information science, energy, environment, mechanical and manufacturing science, transport and aerospace science, and oceanography, etc., which lead to creativity and innovation. To be specific, the researches in the following areas are encouraged: the preparation science of polymeric materials, including high efficient and controllable synthetic methods of polymeric materials, new method and theory in polymer processing, the relationship between the aggregation structures and the properties of polymeric materials and their composite materials; the method and theory in the implementation of the high performance and functional properties of general polymer materials; low-cost and green method in the preparation of functional organic and polymeric materials, the structure-property relationship and the implementation of their high efficiency and stability; performance-directed biomedical polymer materials and evaluation method of their application; new concept in the design theory and preparation method of smart and biomimetic polymer materials; chiral polymer materials, including method in their controllable synthesis, assembly and construction, chirality at nano scale, and functional chiral polymer materials; eco-environmental polymer materials, including the structures, properties and efficient utilization of natural polymers, especially marine biopolymers, as well as the design theory and preparation method of environment-friendly polymer materials, the recycling and utilization of polymeric materials, and the stability and aging of polymeric materials; polymeric materials for environmental control and improvement in water and air pollution.

In 2016, two general program groups will be supported in the following selected directions with some financial preference: flexible electronics manufacturing and chiral polymer materials. On the application function-directed interdisciplinary researches will be encouraged.

Division I of Engineering Sciences

The Division supports fundamental researches in the metallurgy and mining sciences. It mainly covers resources exploitation, safety science and engineering, mineral engineering and separation sciences, materials and metallurgical physical chemistry, ferrous and nonferrous metallurgy, material preparation and fabrication, eco-environment of mining and metallurgy, and resources recycling, etc.

The Division received 1,502 proposals for the General Program in 2015, with an increase of 34.35% compared with that in 2014. Among them, 296 proposals were granted with an average funding intensity of 641,300 yuan per project and a success rate of 19.71%.

In recent years, because of continuous supports, the metallurgy and mining sciences have made great progress, especially in the specific resources field. The current trends of the relevant disciplines are as follows: (i) polarization and extension of the subject; (ii) interdisciplinary and integration of the subject; (iii) relationship between fundamental research and technology development is getting increasingly closer; (iv) basic research, applied research, specific technology development and product development have been closely linked and integrated.

The main research interests of the Division are petroleum and natural gas exploitation, safety science and engineering, preparation of metallic material processing, mineral engineering, metallurgical electrochemistry and battery electrochemistry, etc.

Focusing on the fundamental research, the Division will fund researches on process and engineering, and engineering science is the priority. The Division will continuously enhance the exploration about interdisciplinary research and novel methods, and focus on the new theory, new concept, new method, and their creative application. More attention will be paid to the basic research regarding specific resources. In the aspect of resources exploitation, more emphases will be laid on the engineering science about recovery efficiency, safety and environment. In the aspect of technology, process and equipment, structure optimization, process intensification and enlargement similarity theory of engineered equipment will be emphasized. Systematic and consistent researches will be encouraged. Priority will be given to fundamental researches with theoretical importance, with potential application, which might be the new fields for knowledge creation, and to young scientists who have creative capabilities and good domestic and international cooperation background. A part of cost-intensive projects with hard working environment, such as those in situ mining studies, pyro-metallurgy, high temperature electrochemical projects, etc., will be given higher intensity funding according to the research need.

Research areas to be encouraged are as follows: (i) theory and method of improving recovery efficiency in oil and gas resources; (ii) safe and efficient development method in complexly deep-layer or deep-water oil and gas resources; (iii) scientific exploitation theory of mineral resources; (iv) theory of environmental-friendly mineral separation; (v) clean extraction of polymetallic mineral resources with low grade or complexity; (vi) thermodynamic bases and metallurgical theory of metallic material production with newly high qualities; (vii) formation, transportation and control of contaminants generated in metallurgical process; (viii) information collection and data processing of mining and metallurgy; (ix) high-performance materials preparation and near net shape under multiple fields; (x) accident prevention, life safety insurance and rescue technology base in an accident.

Division II of Engineering Sciences

The Division supports fundamental researches in the areas of mechanical and manufacturing science.

Mechanical science is a fundamental technological discipline to study the functional synthesis, quantitative representation, and performance control of various mechanical products as well as to apply related knowledge and technologies of mechanical systems in developing novel design theory and methodology, including mechanism and robotics, actuation and transmission, mechanical system dynamics, strength theory of mechanical

structures, mechanical tribology and surface technology, mechanical design theory and methodology, mechanical bionics, etc.

Manufacturing science is a discipline mainly to study the manufacturing theories, methods, technologies, processes, equipment and systems for productions with high efficiency, low cost, intelligent methods and high performance. It includes component forming and machining, manufacturing systems and automation, metrology and measurement instrument, MEMS/NEMS, green manufacturing, intelligent manufacturing, and so on.

In 2015, 2,664 proposals for the General Program were received, a 29.82% increase compared with that in 2014. Among them, 545 proposals were funded with an average funding intensity of 632,000 yuan per project and a success rate of 20.46%.

The priority areas to be supported are as follows: (i) the fundamental research for national strategic needs, the frontiers of discipline development, as well as the fundamental research with potentials for industrial applications; (ii) the research directed to environment-friendly, resource-saving, and high energy efficient integration of sustainable design and manufacturing; (iii) the research on the innovative design, manufacturing principle, and measurement theory for ultra, high-precision, high-tech and especially large/heavy equipment and instruments, including processing mechanism, prototyping theory and technology; (iv) the development on the methodology of design and manufacturing for extreme working conditions, for instance, sizes from macro to meso, micro, nano, and multi-scales, and parameters from conventional to extraordinary or extreme conditions; and (v) the multidisciplinary research, multi-field coupling analysis and design method covering mechanical sciences, electronics, hydraulics, acoustics, optics, magnetism, information science and other subjects.

Based upon its mission, the Division will continue to support researches in the nature of fundamental, frontier, exploration and innovation, by encouraging continuous in-depth researches in a specific field, supporting fundamental researches that have achieved innovative results and need further in-depth development. The Division will also support substantial and profound interdisciplinary researches, especially those involving multidisciplinary areas such as electronics, information, biology, materials, and medical science, with the main objective to solve scientific problems in mechanical engineering field.

In 2016, high-intensity funding opportunities within the General Program will be given in form of project clusters to researches focusing on the frontier areas with high breakthrough potentials, such as fundamental theories and methods in complex product design, trans-scale manufacturing of flexible electronic products, and fundamental study of common problems in machining databases.

It is suggested that principal investigators concentrate themselves to the study of their on-going projects instead of applying new projects in short period of time. It is encouraged that young researchers not to participate in the proposals irrelevant to their own research fields.

Division III of Engineering Sciences

The Division supports fundamental research in fields of engineering thermo-physics and energy utilization that involves in engineering thermodynamics, refrigeration and

cryogenics and dynamic characteristics of thermodynamic systems, aerothermodynamics, heat and mass transfer, multi-phase flow, combustion, thermo-physical properties and measurement, and renewable energy utilization, as well as other fundamental and innovative researches related to engineering thermo-physics and energy utilization.

In 2015, the Division received 1,039 proposals for the General Program, increased by 29.23% compared with that in 2014. Totally, 215 were supported with an average funding intensity of 639,300 yuan per project with a success rate of 20.69%.

The main development trends of the discipline are as follows: (i) research on the basic issues has been deepened from macro-level to meso-level and micro/nano-level, from isolated studies to coupled studies, from common parameters to parameters under ultra- or extreme conditions, from routine thermo-physical problems to random, unsteady, multi-dimension, multi-phase and complicated thermo-physical problems and intercrossing research in the discipline; moreover, research becomes more quantitative and precise; (ii) research themes have been crossed over traditional disciplinary borders and integrated with related disciplines, for example, physics, chemistry, life science, information science, materials science, environment and safety. Researches in the following areas are active: the mechanism of new type thermodynamic cycles and non-equilibrium thermal dynamics, refrigeration and low temperature engineering, dynamics, optimization and control of complicated systems, turbulence properties of internal flows and properties and control of unsteady flows, porous media and micro-scale heat and mass transfer, radiation and heat exchange by phase transformation, clean, supersonic and micro-scale combustion, thermo-physical problems in the prevention of disasters, mechanism of interaction between phases and thermo-physical model in multi-phase flow, new principles and methods in thermo-physical measurement, and new thermo-physical principles in renewable energy transformation and utilization.

The Division will give priority to fundamental researches with theoretical importance, potential application and prior prospect, which might be the new fields for knowledge production, continuously promote interdisciplinary studies and the exploration of novel methods, and encourage original ideas and creations. The Division will continue supporting the researches with interdisciplinary nature, or international cooperation background or good achievements got in the completed projects.

Division IV of Engineering Sciences

The Division's funding scope mainly covers architecture, environmental engineering and civil engineering. The development trend of architecture is to study the development of region, city and building, and the innovation of construction techniques from the viewpoint of human-environment relationship, as well as the basic theory, methods of planning and design, and construction technology innovation based on sustainable development strategy. The environmental engineering research is focused on the water or air pollution control and quality amelioration, as well as theories and methods for the treatment, resourcelized and harmless disposal of various pollutants and wastes. Civil engineering stresses that studies should be closely combined with engineering practice to investigate basic theoretical issues and solve foresight key technological issues arising from engineering construction. The interdisciplinary interaction, application of advanced experiment and information technologies and adoption of new materials, new structures and new technologies are the

major features in the development of these research fields.

In 2015, the Division received 2,844 proposals for the General Program, increased by 37.19% in comparison with that in 2014. Totally, 560 were supported with an average funding intensity of 625,700 yuan per project with a success rate of 19.69%.

In the area of architecture, emphasis will be given to new scientific issues arising from urban construction, scientific method in urban planning and building design, and the exploration and innovation of new technologies and new methods. Research on environmental engineering will emphasize key scientific issues related to new theories and technical bases of new high-efficiency and low-consumption technologies, which include water purification, wastewater treatment and utilization, municipal water supply and drainage system, urban refuse disposal and utilization, air cleaning and air pollution control and renovation of the polluted water environment. In the area of civil engineering, more attention should be paid to innovative research on design theories and methods of complex structures. Key scientific issues on the following topics are encouraged: new structure systems and performance design theories, disaster effect and civil infrastructure failure mechanism and performance control, modern structure experiment, on-spot measurement and digital simulation technology. In the area of geo-technical engineering, researchers should focus their attention on the engineering properties of soil under complex conditions, and invalidation mechanism and control methods of geotechnical engineering. In the area of traffic engineering, the emphasis will be on the research of planning theory and key construction technology in traffic infrastructure.

Division V of Engineering Sciences

The Division mainly supports researches in the areas of electrical science and engineering, hydro-science and water research, hydraulic engineering and ocean engineering.

Electrical Engineering

The subject of electrical engineering includes two parts: electric (magnetic) energy science, the interaction between electromagnetic fields and materials. The related research fields include, not least, the electrical energy conversion (mutual conversion between electric power and other kinds of energy), electric machine and its control, power system, power electronics, superconducting technology, pulse power technology, high voltage and electrical insulation technology, engineering dielectrics, discharge and plasma technology, electromagnetic biological technology, environmental electro-technology, electromagnetic compatibility, electric drive and motion control, communication and information for power system, new technology of energy storage and power saving, etc. Furthermore, the two parts share some common basic research contents, such as electric network theory, electromagnetic field theory, electromagnetic measurement technology, and so on.

In 2015, 970 proposals were received for the General Program and 191 proposals were funded with an average funding intensity of 632,400 yuan per project with a success rate of 19.69%.

In the domain of electric energy science, the priority is given to researches on new theories and new technologies related to high efficiency, flexibility, safety and reliability, and eco-friendly electrical energy conversion, transmission and utilization. The research

fields include power generation of new energy and renewable energy, smart grid, wireless power transfer, high efficient conversion and utilization of electric energy, power electronic converters and integration, electric drive and motion control (including electric vehicle, railway traffic, ship and aircraft), superconducting electrical technologies, pulse power technology, efficient power consumption and also the involved information technology, control theory and method for electrical engineering.

As to the domain of electromagnetic field and interaction between electromagnetism and matter, the priority is given to investigation on new phenomena, exploration of new principles, and the establishment of new models and discovery of new applications, as well as the safety and reliability, which are related to power apparatus, novel high power electronic devices, new dielectrics and its application in electrical engineering, measurement of electromagnetic characteristics, coupling between electromagnetic pulsed energy and its applied objects, discharge theory and high active plasma generation. The proposals are highly encouraged for investigations based on electrical science for the interaction between electromagnetic field and biomatter, processing and utilization of biologic electromagnetic signals.

Hydro-Science and Water Research, Hydraulic Engineering and Ocean Engineering

The Division supports basic researches in three areas, hydro-science and hydraulic engineering, geotechnical engineering and hydro-power engineering, coastal and ocean engineering. The research themes include hydrology and water resource, water/soil science and irrigation engineering, hydro environment engineering and water eco-system research, dynamics of river and coast and sediment research, soil/rock mechanics and geotechnical engineering, hydraulics and hydro-informatics, hydraulic structural engineering, coastal and offshore engineering, and naval architectures and ocean engineering.

In 2015, 1,302 proposals were received for the General Program, and 253 proposals were finally granted with an average funding intensity of 632,300 yuan per project with a success rate of 19.43%.

In 2016, encouraged research areas are urban flooding, aquatic ecology and eco-hydraulic engineering. If they are interested in these areas applicants should focus the research on one of the above encouraged research areas in their proposals.

One of key tasks is to study the impact of climate change and human activities on hydrological cycling, extreme flood and drought disasters, and water resources management in the field of hydrology and water resources. Researches in the field of water/soil science and irrigation engineering are mainly focused on the transfer and interaction of water, heat and chemicals in farmland, mechanism of crop water-saving and high-efficient irrigation and drainage scheme and their ecological and environmental impacts. Physical, chemical and biological processes related with hydrological cycling and their responses to large projects are emphasized by researches in the field of hydro environment engineering and water eco-system research. Since water is closely correlated with economy, society, environment and energy, the interdisciplinary and integrated research is encouraged in fields of water resources, hydro environment and water eco-system research. Researches in the area of river and coastal hydrodynamics and sediment dynamics should give their focuses on the fundamental theory of sediment transport, river and estuarine evolutionary, and sediment problems related to large hydraulic works. The key frontiers of hydraulics consist

in the subjects related to water disaster mitigation and eco-environmental protection. The current emphasis of hydro-machinery is on the transit process. Hot research topics in the field of soil/rock mechanics and geotechnical engineering include constitutive modeling of geo-materials, multi-fields and multi-phases coupling, mechanism and process control of deformation and damage, and mechanism and prevention of geo-hazards. New breakthroughs need to be made in the basic research on hydraulic structural engineering under complicated conditions. Environment-friendly and function-based design is an important trend of development in the field of new hydraulic engineering materials. The recent hot research topics in coastal engineering include: port and waterway engineering, marine resources and offshore energy development as well as environment protection, disaster prevention and mitigation in extreme situation; in the area of ship and ocean engineering, more emphasis are put on the motions and response theory of ship and marine structures, new hull form design theory, deep-sea probing technology and relevant theory of deep water resources exploitation, numerical experiments and field test technology, new type underwater sound transducer and communication technology.

According to the statistics on proposals in recent years, the proposed themes have extended gradually and tend to be more interdisciplinary. In 2015, more proposals were found in research fields of ocean engineering, soil/rock mechanics and geotechnical engineering, water environmental engineering and eco-water system research, while less proposals in areas of hydraulics, hydraulic machinery and coastal engineering.

Department of Information Sciences

The Department of Information Sciences funds researches in areas of the generation of signals, acquisition, storage, transmission, processing and utilization of information. Based on the trends of disciplinary development and social progress, the following priorities are set for funding: nano electronics and bioelectronics, radio wave transmission and new types of antenna, information acquisition and information processing, future communication theory and system, space communication network and system, space information processing and application, key problems in theoretical computer science, computer software, computer system configuration and storage system, key technologies in computer application, computer network and distributed computing system, network and information security, bionic sensing and advanced sensors, modeling, analysis and control of complex systems, basic theory and application of intelligent science, advanced robot technology and application, basic research on semiconductor integrated chip system, quantum communication, quantum computation, basics of quantum information technology, optical information display and processing, advanced laser technology, biomedical optics, next generation network and applications, data science and computing science, cognitive science and intelligent information processing, etc. Preferential support will be given to basic researches that meet social demands and have far-reaching importance in promoting the national economic and disciplinary development.

Scientific and technical issues in information sciences are increasingly interdisciplinary in nature. Therefore, the Department pays great attention to proposals for interdisciplinary researches between information science and mathematics, physics, chemistry, life sciences, medical sciences, materials sciences, geosciences and management sciences, and so on. The Department encourages cooperative research among scientists with different backgrounds

and knowledge to put forward cross-disciplinary research proposals. It also encourages scientists to combine theory with practice and explore basic theory and key technical issues that have important application potentials for national economy and security. The Department will continue to give preferential funding to proposals that have a good background of international cooperation in order to encourage scientists to conduct substantial international cooperative research with scientists abroad in frontier areas of information sciences.

In 2015, the Department received 8,240 applications for General Program, a decrease of 22.13% from that in 2014, and funded 1,793 projects with a total direct cost funding of 1.09 billion yuan. The average direct cost funding is 607,900 yuan per project. Some projects are related to interdisciplinary areas with mathematics and health.

In 2016, the PIs of those projects making important progress will be given preferential support towards their new applications.

The Department of Information Sciences encourages creative basic research that is different from traditional research ideas, and welcomes researchers conduct discussions and studies on relevant topics.

**Funding for General Program Projects
in the Department of Information Sciences in 2015**

Unit: 10,000 yuan

Divisions		Projects	Average funding for direct costs	Funding rate (%)
Division I	Electronics and technology	163	10,198	21.94
	Information and communication system	156	9,390	21.97
	Information acquisition and processing	149	9,030	22.51
Division II	Theoretical computer science, computer software and hardware	143	8,779	21.57
	Computer applications	248	15,137	21.29
	Network and information security	149	9,048	21.63
Division III	Control theory and control engineering	191	11,609	24.24
	Systems science and system engineering	47	2,664	15.46
	Artificial intelligence and intelligent systems	149	9,038	21.17
Division IV	Semiconductor science and information devices	173	10,523	22.21
	Information optics and photoelectric devices	112	6,889	21.92
	Theoretical computer science, computer software and hardware	113	6,695	22.55
Total		1,793	109,000	21.76
Average funding per project		60.79		

Interdisciplinary Research between Information Sciences and Mathematical Sciences

In 2016, the Department of Information Sciences and the Department of Mathematical and Physical Sciences will continue to fund interdisciplinary researches that require combined efforts from information sciences and mathematical sciences. The direct cost funding will be about 500,000 yuan per project. The areas to be included are mathematical

theory in information sciences, mathematical methods in information security, information system and advanced control theory.

Encouraged (but not limited to) areas of interdisciplinary researches are:

1. Theory and algorithm of integer representation of real numbers

Design the theory and algorithms of the integer representation of real numbers, to realize the algorithm by computer, and to give complexity analysis of the algorithm.

2. Theory and methods of formalized representation of software systems

Describe and represent, by using the formalization theory and methods, practical software systems applicable not only to real time application software systems, but also to interactive, discrete event software systems.

3. Theory and methods of designing security software systems

Combining typical software system (system software or application software) analysis and design, study the theory, algorithm and system structures of improving the safety performance of software systems, and verify the advantages of the theory, algorithm and system structures both theoretically and practically.

4. Theoretical studies on new software system structure

By addressing the contemporary needs of software application, study the structure, theory and methods of the system structure of novel software and to sum up appropriate scientific characteristics in combination with practical software system.

5. Theoretical studies on the validation of software systems

Establish the theory and methods on the validation of software system development so as to ensure the validity of the developed software.

6. Theory and methods of formalized representation of practical engineering projects

In 2015, we received 275 applications for the projects of interdisciplinary research between Information Sciences and Mathematical Sciences and funded 54 projects with average direct cost funding of 501,100 yuan per project and the funding rate of 19.64%. It should be noted that previous proposals were lacks of fundamental nature and challenge, and did not show complementary role of information science and mathematics. This type of project will support only exploratory research having substantial interdisciplinary nature with information sciences so as to promote the development of interdisciplinary studies between information and mathematics. **Applicants to this category should provide appropriate application codes in the application form. This category belongs to free exploratory research, and is supported only under the category of General Program.**

Division I of Information Sciences

The Division mainly funds basic research in areas of electronic science and technology, information and information system, information acquisition and processing and related interdisciplinary areas.

Electronic science and technology are related to the researches in areas of circuit and system, electronic science and technology, magnetic field and wave, as well as electronics and applications. Funding areas mainly cover the design, test and verification of circuits and system, diagnosis, reliability, micro-nano circuit and system design theory, methods and technology and low energy consumption design method, power, radio electronic circuit and system design theory and method, circuit and network theory, electromagnetic theory and computational methods in electromagnetic fields and waves, characteristics of electromagnetic field and waves in new types of media, scattering and back-scattering, mechanism of interaction between electromagnetic field and wave and objects,

electromagnetic compatibility and electromagnetic environment, electronic wave transmission and antenna, micro wave optics, tera hertz science and technology, transient electromagnetic field theory and application, vacuum device, cathode electronics, surface and membrane electronics, superconducting electronics, quantum electronic theory and device, plasma electronics, molecular and nano electronics in physical electronics, electromagnetic effect in bioelectronics, biochips, medical imaging, medical information detection and processing, medical imaging navigation and key medical instrument technology; information processing and analysis in bioinformatics, analysis of bio big data, detection and identification of cell and bio-molecular information, information network and analysis in biosystems, modeling and simulation of biosystem functions, methods and technology of bionic information processing; sensitive electronics and physical, chemical, (bio)chemical sensors, properties of new types of sensitive materials and sensors, and sensor theory and technology.

Information and information system are related to the researches on the theory and key technologies for information transmission, exchange and application in fields of communication and information system. The main funding areas include informatics, signal coding, channel coding, network service theory and technology, information system modeling and simulation, communication network and communication system security, diagnosis and evaluation, cognitive wireless in information theory and information system; wireless, spatial, underwater, multimedia, optical, quantum, computational, transducer network communication theory and technology, short range communication, body network, wearable devices network, new network access technology, mobile wireless internet technology, and new mobile communication theory and network, future information network theory and transmission mechanism, network communication theory and system, etc.

Information acquisition and processing related to the theory, methods and applied technology of information sensing, acquisition and processing. The main funding areas include signal theory and signal processing, the processing of multi-dimensional signals and array signals, and processing of radar, sonar, remote sensing and voice signals; mathematical theory and methods in information acquisition and processing, and information acquisition mechanism and technology, weak signal detecting and processing, detection and imaging system in information detection and processing, image processing and interpretation, integration of multi-sensor signals, multimedia information processing and presentation, space and marine information acquisition and processing, and applied basic research in mobile network big data, etc.

In 2015, the Division received 2,115 proposals for General Program, and funded 468 projects. The funding rate is 22.13% and the average direct cost funding intensity is 611,500 yuan per project.

In 2016, the Division will continue to support researches in areas of basic theory and key technologies that are significant to the national security in areas of detection and imaging technologies, detection data decoding, normalized interpretation of multi-source and multi-spectrum data, bioinformation acquisition and processing and space information acquisition and processing, under water information acquisition and processing, electromagnetic environmental effect, network information acquisition and processing, communication system security, electromagnetic vortex communication, ambient intelligence communication, wireless multi-domain recognition communication, indoor high speed large capacity wireless communication, green communication, under water communication, short range communication, internet of things and internet of energy resources. The innovative and cross-disciplinary research and exploratory studies with good prospects will be supported that may have some risk and are non-consensus, preferential

funding will be given to the projects which have scored outstanding achievements in previous research. Preferential support will be given and encouraged to the projects which could open and share their research results, and research on the design of software and hardware on the opening data base; it is encouraged the combination of theory and practice to focus on innovation and to study and solve basic problems in important application areas, so as to improve China's research capabilities in this discipline.

Division II of Information Sciences

The Division mainly funds researches in areas of basic theories, basic methods and key techniques related to computer science and technology and relevant interdisciplinary areas.

Computer science and technology is one of the most active, fast-growing and widely influential areas in information sciences. The important trend of computer science and technology development is to obtain super speed, large storage, high performance, high reliability, easy interaction, networking, intelligent and universal applicability. Applicants are recommended to pay attention to these new features in this Division.

The Division emphasizes that proposals are encouraged to focus on key scientific issues and technologies in computer science, and original, fundamental and far-sighted research. We encourage researches on the theory of computer science, software theory and engineering, network security, architecture and system software, computer network, natural language interpretation, data and knowledge engineering, computer graph and virtual reality, image, audio and video processing, man-machine environment, mobile computation, embedded computation, pattern recognition and computer vision, artificial intelligence and machine learning, bioinformation processing, computation intelligence, etc. The Division also stress on funding of studies on theoretical method of new computation, big data analysis, new types of searching, brain-like computing, robot software system, and man-machine coordinated computation, etc.

The Division will continue to support collaborations with researchers in areas of life sciences, medical sciences, mathematics, physics, chemistry, geosciences, mechanical engineering, environmental science and management sciences to make joint explorations on new ideas, new theories, new methods and technologies, developing prototype systems in interdisciplinary areas so as to promote the mutual development of computer science and other sciences. The Division especially encourages and support scientists to address those basic issues that are well known internationally for their complexity and significance and of strong exploratory nature, so as to increase the level and impact of computer science research in China.

In 2015, the Division received 2,517 proposals for General Program, and funded 540 projects (including 27 interdisciplinary projects with mathematics). The success rate is 21.45% and the average direct cost funding is 610,400 yuan per project.

It should be noted that such problems as lack of basic science problems, lack of clear scientific topics, lack of originality in research ideas, lack clear application background and lack of clear research goals and preparations still existed in proposals received in 2015. We suggest applicants aim at the national needs and research frontiers in the discipline, select fundamental, explorative and key scientific issues, and strive to make innovations and breakthroughs so as to make important achievements.

Division III of Information Sciences

The Division mainly funds basic research and far-sighted research for the national

economy and national security in areas of control theory and engineering, systems science and system engineering, artificial intelligence and intelligent systems, etc.

Research funded in the area of control theory and engineering includes control theory and applications, trouble shooting and system service, system emulation and evaluation, navigation, guidance and telemetry, sensor technology and sensor network, multi-information acquisition and fusion, etc.

Research funded in areas of systems science and system engineering includes system modeling and analysis, system dynamics and application, system simulation and visualization, emergence and laws of the evolution of complex systems, system biology, information physical system, system reliability and applications, engineering system design and optimization, engineering system scheduling and decision making, and supply chain, etc.

Researches funded in areas of artificial intelligence and intelligent systems cover basic theory and applications of pattern recognition, method and application of machine learning, method and application of the understanding of natural language, network information searching and processing, knowledge expression, reasoning and discovery, intelligent sensing and system robotics and robot technology, bionic sensing and bioinformation processing, cognitive science and intelligent information processing, etc.

In 2015, the Division received 1,796 proposals for General Program and funded 387 projects. The success rate is 21.55% and the average direct cost funding intensity is 602,400 yuan per project. Some projects are related to interdisciplinary areas with mathematics.

Statistics of recent years show that the following areas are becoming hotspots in application and research: intelligent and self-adaptive control of complex systems, design and application knowledge automation systems, theory and application of control of network security and protection, monitoring, warning and unified control of production process, coordinated control of multi-autonomous system, data and model based system analysis and control, quantum system analysis and regulation, network system analysis and control, intelligent traffic and internet of vehicles, theory and application of complex network analysis, analysis and application of bio-molecular network, theory and application of the internet of things and industrial cognition network; optimal dispatching management of large engineering systems; analysis and optimal design of complex supply chain system; advanced navigation and guidance theory and techniques; quantum navigation theory and system; new types of transducers and bionic sensing; sparse representation and compress cognition; new theory and methods of pattern recognition; new theory of computer vision and realization of high performance system; target identification and tracking in complex background and interference; natural language understanding and syntax computation; recognition of oral language and speakers in complex scenarios; new method and application of knowledge expression and reasoning, large scale knowledge correlation and discovery of new knowledge and application; efficient analysis and computation of big data; theory and application of particle computation; inter media analysis and searching; online machine learning methods of complex dynamic data, mechanism, new models and application of deep learning; advanced robot and bionic robot; micro and nano controlled robot and micro-nano robot; life like integration system and soft body robots; (bio)medical information acquisition, processing and applications; brain-machine interface theory and application, brain-like information processing method and application, cognitive science and computation models. In addition, the Division gives due support to farsighted and interdisciplinary researches such as modeling analysis and control of micro-nano scale systems, modeling, analysis and control of hypersonic aircraft, navigation and guidance and control in deep space and deep ocean exploration, new energy control, management and efficient use, smart medicine, smart city and agricultural information technologies.

In 2016, the Division will continue to encourage and support interdisciplinary research

with mathematics, mechanics, mechanical engineering, semiconductors, optics, energy, environmental science, management, economics, biology, neuroscience and psychology, etc.

Division IV of Information Sciences

The funding scope of the Division covers semiconductor science and information devices, and optics and photo-electronics.

The main scope of funding for semiconductor science and information devices includes semiconductor crystal and membrane material, design and test of integrated circuits, semiconductor photo electric devices, semiconductor devices, semiconductor physics, integrated circuit fabrication and packaging, semiconductor micro and nano mechanical and electrical devices and system, and new types of information devices including nano, molecular, super conducting, quantum functional information devices.

The main funding scope for optics and photo-electronics includes optical information acquisition and processing, photon and photoelectric devices, transmission and exchange photonics, inferred physics and technology (including tetra-hertz), nonlinear optics and quantum optics, laser, spectrum technology, applied optics, optics and photoelectric materials, space optics, atmospheric and marine optics, biomedical photonics and optical problems in interdisciplinary studies.

In 2015, the Division received 1,791 proposals, and funded 398 projects with a funding rate of 22.22% and an average direct cost funding intensity of 605,700 yuan per project.

In recent years, along with the development of information sciences, the above areas are now having more and more interactions with physics, chemistry, materials sciences and life sciences, and many new research directions are emerging. Among the major branch areas, applications remained the same in the following areas: semiconductor photoelectric devices, IC design and test, semiconductor crystals and membrane materials, photon and photoelectric devices, transmission and exchange photonics, optical information acquisition and processing, nonlinear optics and quantum optics, laser and applied optics, etc. Applications are increasing in such areas as semiconductor electronic devices, semiconductor micro-nano mechanical electronic devices and system, IC manufacturing and packaging, semiconductor physics, inferred physics and technology, biomedical photonics, optics and photoelectric materials, spectroscopic technology, etc. There are more applications in areas of new types of information devices, space optics, atmospheric and marine optics, and optical problems in interdisciplinary areas in 2015.

The Division will give priority to researches on high performance light source, low power consumption radio frequency chips and circuits, new types of sensor materials and devices and network technology, tera hertz devices, micro and nano device and technology, new types of optical field control technology and devices, quantum optics and quantum devices, quantum communication and quantum computation, optical information processing and display technology, photon electronic devices and photonic integration, wide gap semiconductor materials and devices, semiconductor integrated circuit system, energy photonics, new types of laser technology and devices, biomedical optical imaging, and space optics, etc. In order to solve the bottleneck issues of devices in various fields in China, the Division will encourage studies to improve device performance (both yield and reliability) including scientific issues in device physics, structure and technology development.

Based on the trend of application in recent years, proposals that track international frontier and hotspot and those that frequently change research directions have low success rate. Researchers are advised to take concrete steps in their research by making in-depth and

persistent studies, and propose better and more creative research topics according to the international research trend and the national development needs.

Department of Management Sciences

Management is an interdisciplinary science which aims at revealing and applying the basic laws of various management activities. The research findings can be used to optimize the utilization of limited resources. The Department of Management Sciences consists of three divisions, handling proposals of Management Science and Engineering, Business Administration, and Public Administration and Economy Management, respectively.

During the thirteenth Five-Year period, the Department of Management Sciences will further encourage innovative studies, welcome research proposals of discovering universal scientific issues based on Chinese management practices and then to explore these issues, to enrich the knowledge of human management sciences.

The Department emphasizes applying “scientific methods” to explore the objective laws of management sciences; therefore ordinary management research will not be supported. The Department supports experimental research that observes and discovers the new management phenomena based on data obtained from experiments, observations, and measurements, etc. The Department also supports theoretical research that aims at addressing management issues by analyzing and explaining management phenomena through modeling, computation, induction and deduction. The Department will offer higher funding support than the average funding level for experimental research projects that do need long-term and large-scale data collection, data processing, and filed investigation, and high performance computing and experiments.

The Department of Management Sciences encourages and supports scientists from diverse academic backgrounds to take an active part in management science research and contribute to the development of management science, a comprehensive interdisciplinary science. However, please note that applications focusing on social science and humanities, as well as those within the funding scope of other scientific departments of NSFC, will not be accepted by the Department of Management Sciences. Applicants are advised to propose their research topics from the perspective of management science research.

General requirements for applications in 2016 are as follows:

1. No repetitive funding with the National Social Science Fund

To optimize the allocation of the National Natural Science Fund and to ensure that project leaders invest adequate time and energy in their on-going national projects, the Department will decline proposals by the following applicants in 2016:

- (1) Applicants who were supported by the National Social Science Fund as a project leader within the past 5 years (from Jan 1, 2011), and have not yet got the project completion certificate awarded by the National Planning Office of Philosophy and Social Science until the deadline of this year’s fund application.

Note: if an applicant has gained the project completion certificate from the National Planning Office of Philosophy and Social Science, and is applying for a NSFC project with the application code starting with G, he/she must provide a copy of the certificate with an official signature of his/her home institutions.

- (2) Applicants who submit proposals to both the Department of Management Sciences of NSFC and the National Planning Office of Philosophy and Social Science in 2016.

2. Accuracy and integrity of information

Applicants are responsible for the accuracy, integrity, and reliability of the contents of

their applications, and their home institutions are obligated to undertake serious check on the relevant information. The following requirements should be complied with when applicants prepare and submit the project proposals:

- (1) Applicants are required to give a detailed description on their previous research work related to the proposed work, as well as the publications published in previous work. For publications that are accepted and waiting to be published, a copy of the acceptance notice should be provided in the proposal.
- (2) The Department does not allow applicants to submit the same proposals to more than one science funding agency. Applicants who propose new research topics based on their previous NSFC projects are required to clarify the relations and differences between the newly submitted proposals and the previous NSFC projects. For applicants who are undertaking projects funded by other agencies, such as MOST, NSSF or local science funding organizations, they are required to clarify the similarities and differences between their on-going projects and the new proposals submitted to NSFC.

3. Special requirements for project leaders starting NSFC projects in recent years

To ensure that project leaders invest adequate time and energy in their on-going projects, the applications who gained any kind of NSFC projects as a project leader in 2014 or 2015 (especially 2015) will be reviewed and assessed through stricter procedures.

4. Consideration of the performance of accomplished projects

The Department conducts performance evaluation for all General Program projects, Young Scientists Fund projects, and Fund for Less Developed Regions projects one year after these projects were complete. The evaluation results will be released to the public on the NSFC website. Researchers with good performance evaluation results will be given priority for funding when they apply for new projects. However, researchers with bad performance evaluation results will undergo stricter review procedures when they apply for new projects.

In 2016, the average funding intensity for direct expenses of General Program projects will be from 450,000 to 550,000 yuan per project.

**Funding for General Program Projects
in the Department of Management Sciences in 2015**

Unit: 10,000 yuan

Divisions		Projects	Average funding for direct costs	Funding rate (%)
Division I	Management science and engineering	198	9,522	21.95
Division II	Business administration	210	10,100	20.55
Division III	Macro-management and policy	292	14,038	17.81
Total		700	33,660	19.64
Average funding intensity for direct expenses per project		48.09		

Division I of Management Sciences

The Division of Management Science and Engineering mainly supports research projects associated with fundamental theories, methods and techniques in the field of management science, which include the history of management science, general management theory, operations management, decision-making and game theory, evaluation

theory and method, forecast theory and method, management psychology and behavior, management system engineering, industrial engineering, system reliability management, information system management, quantitative economics theory and method, technology and approach of risk management, financial engineering, complexity science, knowledge management, and engineering management, etc.

The Division emphasizes basic theories and frontier areas, gives funding priority to fundamental and frontier research in the above-mentioned field, and encourages innovative research on management theory and methods integrated with China's management practices, management philosophy, and cultural characteristics.

In 2015, the Division received a total of 902 applications for General Program and funded 198 projects. The funding rate was 21.95%.

During the recent years, the discipline of management science and engineering has experienced rapid development in China. The quantity of academic papers in the fields of operation and optimization methods, and information technology and management is increasing. However, the number of papers published by Chinese scholars in high-level international journals is still relatively small. Therefore, the quality of academic publications in China should be further improved.

In 2016, the Division will continue to support proposals aiming at innovative fundamental scientific issues, encourage scientists to publish their research results in high-level international journals, and provide consecutive support for projects and teams that have shown great research abilities and innovative potentials. The Division will strengthen the support for the projects associated with production practices, and encourage scientists to integrate theories and methods with the practical issues of enterprises, to solve the problems from management practices in China, and to form the management theory and methods for China. The Division also encourages integrations of management sciences and mathematics, economics, behavior sciences, information sciences, as well as other disciplines, supports studies that address the scientific issues of management science by developing new theory, methods, and practices through multi-interdisciplinary. The Division encourages the project leaders to track closely the international academic frontier, publish their research work in reputable international journals, and have innovative research achievement that can gain the attentions from the world.

Division II of Management Sciences

The Division of Business Administration mainly supports fundamental research and applied fundamental research on management theories and new management techniques and methodologies, taking micro-level organizations (all types of industries, enterprises, institutions, and nonprofit organizations) as research objects. The funding areas of the Division include strategic management, business theory, innovation management, organizational behavior and company culture, human resource management, company finance and financial management, accounting and audit management, marketing, operations management, production management, quality management and quality engineering, logistics and supply chain management, service science and service management, technology management and technology innovation, project management, entrepreneurship and SME management, enterprise information management, e-commerce and business intelligence, non-profit organization management, etc.

In 2015, the Division received a total of 1,022 applications for General Program and funded 210 projects. The funding rate was 20.55%.

In 2015, many applications were focused on enterprise financing and finance

management, marketing management, logistics and supply chain, accounting theory and method, innovation management, strategy management, organizational behavior, and small and medium enterprises management, and correspondingly, the number of funded projects in these fields was larger than in other fields. Although the number of applications in the fields of service management, production management, quality management, and the non-profit organization management was small, their funding rate was increased compared to that in 2014. In general, the proposals aiming at new methods and technologies have shown some innovation, and the number of applications focusing on new issues and China's practical needs was increasing. From a perspective of funding structure, a balanced distribution of funding areas has been formed.

In 2016, the Division will continue to actively support innovative and frontier research, including theory innovation and new knowledge discovery and creation, scientific accumulation and discovery research by integrating empirical analysis, case studies, and observation experiments, scientific issues derived from China's management practices which have potential social application values, and those research with substantial international cooperation. The Division promotes scientific spirits, encourages exploration, and supports original fundamental research.

In order to promote the balance within the discipline, the Division will continue to support frontier fundamental research in areas of corporation strategy, company finance, accounting, organization behavior, entrepreneurial and innovation management, marketing, e-commerce and business intelligence, logistics and supply chain management, operation management, etc. Preference will be given to areas of human resource management, SME management, service management, logistics management, quality management, enterprise information and resource management, risk and safety management of large projects, and non-profit organization management. Meantime, the Division will strengthen the support for theory innovation research based on Chinese management practice.

Division III of Management Sciences

The funding areas of the Division of Macro-management and Policy include two disciplines, public administration and policies, and economy management. The former discipline covers public administration and policy, science and technology management and policy, health management and policy, education management and policy, public security and crisis management, labor, employment and social welfare, resources and environment management and policy, information resources management, etc. The latter discipline covers macroeconomic management and strategies, financial management and policy, tax management and policy, industry policy and management, agriculture and forestry economics management, and regional development management. These two disciplines focus on the behavior laws of the government and related public administrations on formulating macro-policies and implementing comprehensive management to achieve the economic and social development goals, which are aimed at promoting the discipline development, improving academic innovation, developing talented scientists and research groups. The Division encourages researchers to provide consultation, support and suggestions for national macro decision making when developing related theories and methodologies.

In 2015, the Division of Macro-management and Policy received a total of 1,639 applications for General Program (920 for public administration and policies, and 719 for economy management) and funded 292 projects (166 for public administration and policies, and 126 for economy management). The funding rate was 17.81%.

During recent years, within the public administration and policies discipline, the number of applications focusing on resource and environment management and health management and policy was high, and so was the number of funded projects. The number of applications focusing on public security management and education management increased rapidly, while the number of applications focusing on urbanization and aging increased even more rapidly. For the economy management discipline, the ratios of applications in the fields of agriculture and forestry economy management, financial management, and macroeconomic management were relatively higher, and the applications in tax management and policy was rather few, which reflects the differences between various research areas in scale of research capacity. Many applicants concentrated on hot topics associated with macro-management and policy practices in China, and submitted high-quality research proposals.

In 2016, the Division will pay more attention to research proposals in the fields of social governance, health service management, public security and crisis management (emergency management), and aging society of the public administration and policies discipline, and macro-economy regulation, internet finance management, industrial upgrading and transformation, and new-type urbanization development of the economy management discipline.

The applications should take China's practical management issues as the main research objects, and bring up scientific theoretical issues from the research objects accurately. Special attention should be paid to the scientificity and normativeness of the research methods. Applicants need to be able to differentiate between management science research and actual management work, and between a Natural Science Foundation project and a humanity and social science project in terms of research methods. The scope of the research topic needs to be appropriate, the research goal needs to be concentrated, and the research content needs to be specific and concrete. The research method and technology roadmap, as well as how to address the key scientific issues, needs to be clearly clarified in the application.

Department of Health Sciences

In view of the fact that scientific research is both curiosity-driven and national needs-driven, the objective of the funding for General Program in the Department of Health Sciences is to support basic research on issues concerned with disease prevention, disease control and disease treatment in China. Major funding areas include: the structural, functional, developmental, genetic and immune abnormalities of organisms, the occurrence, development, outcome, diagnosis, treatment and prevention of diseases.

The Department encourages research areas as follows:

- (1) Innovative theoretical and methodological research aimed at the scientific issues emerging from medical practices;
- (2) Systematic and indigenous study on key scientific issues emerging from medical disciplines;
- (3) Research on translational medicine through combination of basic research and clinical research;
- (4) Integrative medical research on the occurrence, development and regression of diseases at various levels from molecular, cellular, tissue to the whole-organism, individual and population level by using new multidisciplinary and comprehensive techniques or methods;
- (5) In-depth systematic and innovative study based on existing accumulated researches;

- (6) Interdisciplinary medical research crosscutting with other scientific fields;
- (7) Research on the development of new animal models of human diseases;
- (8) International joint research.

The Department will give priority to basic research on major key diseases closely related to the national welfare, human livelihood, major emergency event of public health, and common or frequently encountered diseases that severely affect human health. Meanwhile, the Department will also highlight research of rare diseases and other weak research areas in an effort to keep the balance and coordinative development of various disciplines.

In 2016, the Department will give special support to research aimed at studying the development and prevention of human rare diseases. The rare diseases are defined by WHO as diseases accounting for 0.65‰ to 1‰ of the total population. Applicants are expected to take the advantage of genetic resources in China, and to carry out in-depth research on prevention, diagnosis, and drug development of rare diseases, making achievement with own proprietary intellectual properties, and high international impacts. Meanwhile, case studies of major key rare diseases are highlighted in an effort to advance the understanding of pathogenesis underlying the development of major key diseases, thus providing theoretical bases for their novel diagnostic and therapeutic strategies. The applicants are expected to choose the proper secondary application codes attached to the primary application codes (H01 to H31), and to write “Mechanism underlying rare diseases (including case studies) and their prevention and treatment” on the annotation column of the application form.

In 2016, the Department will also give special support to research aimed at the development and function of lymphatic system. Research aimed at the regulation mechanism underlying the generation, maturation and homeostasis of the lymphatic system, the relationship between lymph and blood, the roles of lymphatic system on lipid metabolism, the immune defense function of lymphatic system, and the pathogenesis of major key diseases related to lymphatic system, are all encouraged.

1. Specific instructions for applicants

- (1) Applicants are encouraged to carry out in-depth basic research toward scientific issues, especially the original research. Applications with unique academic ideas or solid previously accumulated research work are encouraged to carry out further systematic research. Simple descriptive or observant applications and applications tracking others', without innovative scientific ideas should be avoided.
- (2) Applicants are expected to propose a defined scientific issue or a specific hypothesis based on analysis of the relevant latest literature and research progress in the field, and elaborate the scientific significance and values of the anticipated research results in detail.
- (3) Applicants are expected to propose adequate research contents, detailed research design, clear research methods and reasonable budget; the proposed research is supposed to be specific, scientific, feasible and logical. Besides, applicants are expected to elaborate how the proposed research will possibly solve the specific scientific problems or verify the hypothesis.
- (4) Applicants are expected to provide detailed information about relevant previous research. In case of extensive applications of previously funded project, the innovative ideas and further scientific problems of the research are expected to be elaborate in detail. Besides, all the relevant published papers are expected to be listed, and relevant unpublished results including experimental data, tables and graphics, pictures, etc., are attached.
- (5) Applicants are expected to provide true and accurate information in their

applications, including the curriculum vitae of applicant and major participants (both education and working experience are expected to be included, in chronological order with exact months and years, keeping the timeline consistent), previous grant information and relevant publications. For publications, detailed information including the names of all authors (in the same order in which they appeared in the publication), the article and journal title, book title, volume number, page number, and year of publication (abstracts or meeting proceedings should be specified) should be included. The corresponding authors should be marked “*”, and the co-first authors or co-corresponding authors should be marked and listed as is in the paper. Accepted manuscripts should be listed along with an attached acceptance letter or online publication link, unaccepted submitted manuscripts or manuscripts in preparation should not be included. Patents and awards should also be listed.

- (6) Applicants are expected to provide a signed written institutional certification or approval (the scanning copy should be attached to the electronic proposal) to meet the related ethical or informed consent requirement if their applications involve special medical research objects such as human subjects.
- (7) Applicants are expected to follow all appropriate guidelines for the use and handling of pathogenic microorganisms, including the guideline “Bio-safety Administrative Rules of Pathogenic Microorganism in Lab” released by the State Council of China and the ethical and bio-safety regulations by other governmental agencies. Additionally, a commitment letter to guarantee bio-safety should be provided by the research institutions when applications are involving highly pathogenic microorganisms.
- (8) Applicants are expected to have good performance records in their previous grants and will be given priority funding if they have done so in their previous grants.
- (9) Applicants are expected to notice that: in 2016 the Department will generally not give further funding to applicants who either have got high funding intensity in 2015 from NSFC (such as Key Program, Major Program, Major International and Regional Joint Research Program, etc.), or are applying for repetitive or similar research to their on-going national scientific projects funded by other agencies.
- (10) Applicants are expected to provide PDF copies of no more than 5 representative papers in their electronic applications.
- (11) Applicants are expected to refer the specific requirements for various programs via the website of the Department (<http://health.nsf.gov.cn>).

2. General overview of applications in the Department in recent years and instructions to research institutions

The number of applications has been increasing in the Department of Health Science ever since its establishment in 2009. In 2014 and 2015, the number of applications was 40,696 (from 961 research institutions) and 44,635 (from 985 research institutions), accounting for 26.47% and 26.62% of the total applications in NSFC, respectively.

To enable the rapid and healthy development of both scientific fund and medical research in China, the research institutions are expected to further strengthen their organization and management in the process of NSFC grant applications, and make an effort to further improve the scientific quality of applications (rather than increase the number of applications) under the guidance of “Requirements of NSFC for Institutions to Improve Management of Scientific Projects”.

3. Specific Explanations on application codes

Peer review activities of the applications in the Department are organized according to

the application codes attached to this guide. The application codes of the Department of Health Sciences compose of 31 primary application codes (H01 to H31) and many relevant secondary codes. The basic characteristics of the application codes are as following: (i) the primary application codes, which are mainly arranged in the order of organs or systems, include research areas relevant to both basic and clinical research, in an effort to ensure that applications on similar scientific issues from different disciplines are reviewed in the same reviewing system; (ii) The secondary application codes, which are arranged in the order from basic to clinical research and from structural, functional and developmental abnormalities to diseases, cover both basic and clinical research relevant to the given organ or system.

The applicants are expected to carefully choose the primary application code and the relevant secondary code. For the details, please refer to the following contents in the guide of each Division of the Department.

4. Special policy for applications involving the development of animal models of human diseases

Animal models for mimicking human diseases are requisite to biomedical research, not only for understanding mechanism of diseases, and identifying new drug targets, but also for drug evaluation in clinical trial phases. The Department will give special support to applications for General Programs involving the development of animal models of human diseases. Basically, animal models for mimicking human diseases include both spontaneous animal models and inductive (laboratory) animal models, the latter may include gene modified animals (transgenic models, gene knock in/out models, ENU inductive models and cloning models), surgical animal models and physical- or chemical-induced animal models.

The funding intensity of direct cost is averagely 1.1 million yuan, and the duration is 4 years. Research in the following areas are especially encouraged: (i) identification of spontaneous animal models of human diseases; (ii) the development and standardization of various new inductive animal models; (iii) studies on the impacts of various environments on animal models; (iv) comparative medical studies on various species of animal models of the same disease; (v) Resource information and databases of animal models; (vi) Technical improvements in developing animal models. New animal models for human diseases are one of the fundamental works in experimental medical research, thus the Department will give long-term continuous support in order to provide technical platforms and facilitate research progress in this area in China.

The applicants are expected to choose the proper primary and secondary application codes based on their proposed research, and “The Development of Animal Models for Human Diseases” should be written in the annotated column of the application form. The similarity and differences in disease susceptibility and clinical symptoms between animal models and human diseases should be elaborated, and a detailed analysis of the available animal models of a given human disease is required to avoid repeated research. All the government requirements concerning animal welfare and ethical issues should be met. There is an “animal model” special column on the website of the Department (<http://health.nsf.gov.cn>), and the principal investigators are expected to submit the progress report of the project in time, and to contribute to the validation, spread, and application of the animal model.

5. Funding plan and budget for General Program in 2016

The funding intensity of direct cost funding of each project of the General Program in the Department is expected to be averagely 600,000 yuan, basically the same as that in 2015, and the duration will still be 4 years. Doubled funding will possibly be given to excellent innovative research built upon previous strong background. Applicants are expected to request the adequate budget for their proposed work by filling out the budget form with

detailed justification.

The support research areas of each Division, and an overview of the award number, funding, and success rate of the General Program in 2015 in the Department are listed in the table below.

**Funding for General Program Projects
in the Department of Health Sciences in 2015**

Unit: 10,000 yuan

Divisions		Projects	Average funding for direct costs	Funding rate ⁺⁺ (%)
Division I	Respiratory system, circulatory system, blood system	439+25*	25,499+625*	22.13
Division II	Digestive system, urinary system, endocrine system/metabolism and nutrition support, ophthalmology, otorhinolaryngology head and neck science, oral and craniomaxillo-facial Science	543+17*	31,394+425*	21.54
Division III	Neurological and psychiatric diseases, gerontology	347+14*	20,457+350*	21.71
Division IV	Reproductive system/perinatology/neonatology, medical immunology	228+12*	13,137+300*	24.84
Division V	Medical imaging and biomedical engineering, special medicine, forensic sciences	223+13*	12,859+325*	20.63
Division VI	Medical pathogenic microorganisms and infection, orthopedics and sports medicine, emergency and intensive care medicine/trauma/burns/laboratory medicine/plastic surgery/ rehabilitation medicine	367+15*	21,165+375*	20.38
Division VII	Oncology (leukemia not included)	752+31*	43,229+775*	19.57
Division VIII	Skin and appendages, preventive medicine, epidemiology, occupational medicine, radiology	224+12*	12,849+300*	24.89
Division IX	Materia medica and pharmacology	241+13*	13,808+325*	22.18
Division X	Chinese medicine, Chinese materia medica, integrated chinese and western medicine	558+28*	32,043+700*	18.61
Total		3,922+180*	226,440+4,500*	20.94
Average direct cost funding per project		56.30 (57.74**)		

Note: *One year program; ** One year program not included; ++ One year program included

Division I of Health Sciences

The Division I provides grant support for basic research on the diseases of respiratory, circulatory, and hematological systems.

Respiratory System (H01)

The Division mainly funds the basic and clinical basic research on the diseases of lung, airway, pulmonary circulation, mediastinum, pleura, thoracic cage, and diaphragm. Our

funding areas cover disease mechanisms, pathophysiological changes and treatment strategies involving the studies on lung and airway structure, function and developmental abnormalities, lung, airway immunity and transplantation, lung and blood barrier, lung fluid transport and pulmonary edema, respiratory infections, inflammatory and defense response, lung injury, repair and remodeling, airway inflammation associated with asthma, chronic obstructive pulmonary disease, pulmonary circulation and pulmonary vascular disease, interstitial lung disease, granuloma, sarcoidosis, respiratory control and sleep-disordered breathing, pleural disease and new methods, techniques and animal models of the respiratory system diseases.

In recent years, the effects of respiratory emerging infectious diseases and ambient particulate matter (such as haze, etc.) on human health have been attracting more and more attentions. Therefore, applicants are encouraged to carry out studies focusing on the basic and clinical basic researches related to: (i) environmental pollution-induced respiratory diseases and pathogens-induced respiratory barrier damage; (ii) pulmonary fibrosis, tissue damage repair and inflammatory microenvironment regulation; (iii) bronchial or alveolar epithelial cell dysplasia and nodular lesions; (iv) lung stem cells and lung regeneration; and (v) the priority research areas also cover studies on the establishment of respiratory research platforms and new research models. Applicants are largely encouraged to elucidate the mechanisms of respiratory diseases, explore the potential disease diagnostic and treatment targets by combining new techniques and concepts of biomedical research.

In the past, the submitted and funded proposals in the respiratory areas mainly focus on airway inflammation associated with asthma, lung injury, repair and remodeling and chronic obstructive pulmonary disease. We hope to emphasize studies in the areas of lung-blood barrier; respiratory infection, inflammation and defense responses; chronic cough; nodules and pleural diseases. We also encourage studies in: (i) cell therapy for respiratory diseases; (ii) combine of latest developments in biomedical research; (iii) genetic and epigenetic studies on respiratory diseases; (iv) immune regulation mechanism; and (v) seeking for new diagnosis and treatment approaches, the potential of molecular markers and intervention targets for precision medicine and personalized medicine.

All applicants who tend to apply for pulmonary circulation and pulmonary vasculature studies can choose the codes of either respiratory system (H01) or circulatory system (H02), according to their specific research contents.

Circulatory System (H02)

The Division mainly supports researches on morphological, functional and developmental abnormalities in circulatory system, including cardiac and vascular diseases, microcirculation and shock. Applicants are encouraged to carry out original and translational research, working together with clinicians, developmental biologists and genetic biologists, to study on the mechanisms of cardiovascular diseases and the development of therapeutic strategy. In the cutting-edge fields of cardiovascular diseases, researchers are encouraged to establish international collaborations, to propose innovational hypothesis based on their own research data, and eventually gain achievements with independent intellectual properties. Research on the roles of endogenous biological active substances on the regulatory and injury mechanisms of cardiovascular diseases and the screening and identification of potential biomarkers for the diagnosis and treatment are also encouraged. In the past years, proposals covered all scientific topics in circulatory system, but most proposals were focused on cardiac/vascular injury and protection, and followed on atherosclerosis, coronary heart diseases, arrhythmia, hypertension, and heart failure. Metabolic disorder is closely related to cardiovascular disease, and applicants are encouraged to conduct the researches on the internal relation and mechanism, as well as the

intervention targets, between metabolic disorders and cardiovascular diseases. The innovative proposals in this direction will be highly funded in 2016.

Hematological System (H08)

The Division will mainly support original research in the development and formation of hematopoietic cells and organs, hematopoietic stem/progenitor cell and hematopoiesis regulation, red cell and its diseases, leukocyte and its diseases, platelet and its related diseases, aplastic anemia and bone marrow failure, myelodysplastic syndromes, myeloproliferative diseases, blood infection and its treatment, bleeding, coagulation and thrombosis, leukemia, hematopoietic stem cell transplantation and its complications, mesenchymal stem cell and blood disease treatment, blood typing and blood transfusion, hereditary hematologic disease, lymphoma, myeloma, plasma cell diseases, diagnosis and treatment methods for hematological diseases, novel research methods for hematological diseases.

The current research hotspots in hematological field include: regulation of hematopoiesis and hematopoietic cell reprogramming; interaction between hematopoietic cell and leukemic cell and their microenvironment under the disease condition; clonal evolution of malignant hematologic diseases; drug resistance in malignant hematologic tumors; and hematopoietic stem cell transplantation and its biological and immunological issues; hematological disease omics; hematologic biomarkers and their functional validation; maintenance of leukemic stem cell and its clinical correlation; cellular and molecular targeting therapies of hematological diseases; in vitro differentiation of stem cells to hematopoietic stem cells; platelets, blood vessel and coagulation factors, their interaction and mechanisms.

Currently, most applications and funding are concentrated in fields of leukemia, lymphoma, myeloma, hematopoietic microenvironment and stem cell transplantation. Applications in other categories are relatively low especially in the areas of red cell diseases, blood coagulation and thrombosis, cell and molecular targeting therapies. Thus, the applicants this year are strongly encouraged to submit applications in the fields of hematopoietic microenvironment and hematologic disease development, clonal evolution of hematologic malignancies, heterogeneity of diseased cells, and precision medicine. Applications are encouraged to initiate clinical basic research and ask basic research questions from clinical perspective, translational research fully utilizing clinical resource, research using the state-of-the-art technologies with hematological research platforms and innovative disease research models, translational research in biotherapies such as HSC transplantation, MSC therapy, immunotherapy, etc. Selected application in these fields will receive more funding in this 2016 grant cycle.

In 2015 grant application cycle, grant application for hematologic lymphoma studies (H1616) was transferred to Division I with an application code of H0818. In 2016, hematologic lymphoma studies will further divided into lymphoma (H0818), and myeloma and plasma cell diseases (H0819). For malignancies in other system, please refer to the description in general section of medical sciences.

Division II of Health Sciences

Division II mainly supports basic researches on digestive system, urinary system, endocrine system/metabolism and nutrition support, ophthalmology, otorhinolaryngology, head and neck science, as well as oral and craniomaxillo-facial science.

Digestive System (H03)

The funding scope mainly covers basic researches on diverse non-infectious and non-neoplasm diseases of digestive system. Proposals on liver diseases, such as hepatic fibrosis, cirrhosis and portal hypertension, were the most dominant research areas in this field, amounts for 14.4% of all proposals last year. Other research interests in liver diseases were hepatic regeneration, liver protection, liver failure and artificial liver (10.3%), metabolic dysfunction of liver and related diseases (8.1%). Other proposals covered mechanisms of immune-related diseases of digestive tract (9.1%), internal environment disturbance of GI tract, intestinal mucosal barrier impairment and related diseases (8.5%), abnormal GI motility and functional GI disorders (6.7%), pancreatic exocrine dysfunction and pancreatitis (6.1%), digestive organ transplantation (7.1%). The number of applications on the structure and functional impairment of abdominal wall/peritoneum, endocrine and neuro-humoral regulation of digestive system, acid-related diseases and vascular circulation abnormalities of digestive system was kept at a relatively low level.

Various liver diseases, especially fatty liver diseases, hepatic fibrosis, cirrhosis, liver damage and regeneration, and liver transplantation are receiving more attention. Among the gut diseases, applications on the intestinal microecology disturbance, immune diseases of digestive system, mucosal barrier abnormalities and related diseases increased significantly in recent years. Mechanism of gastrointestinal motility and functional GI disorders got lots of attention. Drugs, toxicants or alcohols-related digestive diseases are also hot issues in this field. Research on these important problems mentioned above, and studies on the pathophysiology of pre-clinical phase of these diseases and the mechanisms of functional disorders, relationship among different digestive organs in the pathogenesis of digestive system diseases are encouraged.

Urinary System (H05)

Studies on the structure and functional disorders of kidney, ureter, bladder, prostate and urethral canal, and all the disease related proposals except tumor research were included in this code. The amount of proposals received in 2015 increased by 4.57% compared with that in 2014. The submitted proposals mainly focused on damage and repair of the urinary system (19.38%), secondary renal diseases (16.29%), primary renal diseases (10.76%), as well as renal failure (10.54%). The amount of proposals focus on prostate, bladder diseases and urodynamic study was similar as that in 2014. The research proposals on infection of urinary tract and renal endocrine dysfunction were still few. The Division will continue to support consistent and innovative researches in these fields.

Endocrine System/Metabolism and Nutrition Support (H07)

The Division mainly supports studies on the structure, function disorders of endocrine systems (except tumor research), including diseases related research of endocrine system, and endocrine function and abnormality of classical and non-classical endocrine organs, and supports various dysfunctions of metabolism, malnutrition and nutrition support. The amount of proposals in 2015 increased by 18.8% compared with that in 2014. The majority of proposals were diabetes related (53.9%). The percentages of proposals on energy metabolism/obesity, bone metabolic diseases, thyroid diseases and metabolic syndromes were 15.3%, 10.1%, 5.2% and 3.7% respectively. There were few proposals on abnormal of nucleic acid metabolism (such as hyperuricemia and gout), disturbance of water and electrolyte metabolism and abnormal acid-base balance, amino

acid metabolism, development or structure abnormal of adrenal gland, as well as thyroid and parathyroid transplantation. Division II will pay more attention and support preferentially on these areas in the future, and encourage innovative applications on questions arising from clinical practice, with proper research design and approach.

Ophthalmology (H12), Otorhinolaryngology Head and Neck Science (H13), Oral and Craniomaxillo-facial Science (H14)

The Division mainly supports non-neoplasm diseases of related fields. In the field of ophthalmology, the Division mainly supports inflammatory diseases, immune diseases, hereditary diseases, as well as degenerative and neo-vascularized diseases. Researches on fundus diseases were still the most concentrated areas in 2015, accounted for 32.0% of total proposals, followed by glaucoma (16.8%), corneal diseases (15.0%), and optic nerve and visual pathway related diseases (11.3%). The common hot topic of ophthalmology was the researches on the molecular mechanisms of diabetic retinopathy, neovascular eye diseases, glaucoma retinal ganglion cells (RGCs) damage and pathologic myopia.

The amount of proposals in otorhinolaryngology last year increased by 22.4% compared with that in 2014. The proposals mainly focused on auditory abnormality and balance disorders, amounted for 42.1% of the total proposals, followed by olfactory, nose and anterior cranial base diseases (26.4%), and throat and neck diseases (9.85%). Hearing related researches were key-issues in otology, including the genetic and molecular pathogenesis on various types of deaf, and signal pathways related with hear damages. The amount of proposals focus on words and music recognition related studies after cochlear implantation was similar as that in 2014. Pathogenesis of rhinitis and sinusitis, allergic rhinitis and its immunotherapy were hotspots in the field of nosology. Proposals on the throat diseases were mainly focused on pararthria and functional repair. Obstructive sleep apnea hypopnea syndrome (OSAHS) is another concerned area. Pathogenesis and interventional treatments Tinnitus, acoustic sensitivity, circumgyration, dysosmia will be the future direction. More general projects with high funding intensity will be supported in this field. In areas of oral and craniomaxillo-facial science, there were more proposals on the periodontal and oral mucosa diseases, accounted for 19.9% of total proposal, followed by tooth defect, anodontia, repair and correction of dentognathic deformity (14.8%), as well as dental pulp and periapical diseases (13.6%). The number of proposals on the dental-derived and adipose derived stem cells reached to 236. The researches on the implant materials were still hot fields, with 104 proposals. The Division will continue to support researches on most severe, common, complicated diseases or functional disorders in the above fields, support research on pathogenesis, diagnosis, novel treatment procedures and functional reconstruction, and support researches on areas related to general health of human body.

The Division does not support researches on drug design and pharmacology as well. Please submit the related proposals to Division IX of Health Sciences (H30, H31). Proposals on the male reproductive system and male sexual dysfunction are not included in code H05, so please submit related proposals to Division IV (H04). It is specially noted that the proposals on teeth repair and implant material should use code H1409, and the proposals on craniofacial bone, cartilage tissue in the field of oral medicine should use code H1402. Other proposals related with characters of oral orthodontic and repair should submit to code H1408. Division II does not support cancer research in above areas. All applications on cancer research in those areas please refer the general introduction of proposal guidance from Department of Health Science.

Division III of Health Sciences

Division III mainly supports basic research in the fields of neurological diseases, mental disorder and gerontology.

Neurological Diseases and Mental Disorder (H09)

The Division mainly supports basic and applied research on the structure, function, heredity and developmental anomalies of the nervous system, as well as the etiology, pathogenesis, diagnosis and treatment of non-tumorigenic neurological diseases. The Division supports research on common disorders in the nervous system such as cerebrovascular diseases, brain and spinal cord trauma and repair, pain, epilepsy, and neurodegenerative diseases. In addition, the Division supports research on pathologic mechanisms of rare nervous system diseases and CNS inherited metabolic diseases. Furthermore, research on the mechanism and the therapeutic approaches of inflammatory immune disease in the nervous system is also an important direction for funding. At the same time, research on the etiology and relevant clinical studies of comorbidity in neurological and psychiatric diseases will be focused.

Modern disease spectrum is characterized by a rapid rise in the prevalence of psychological and psychiatric diseases. Research efforts based on unraveling biological mechanisms are mainly aimed at increasing early recognition, reliable diagnosis and improvement on treatments of these disorders. There were fewer applications on crisis intervention in 2015. Most applications were written on schizophrenia and depression, yet an increase in the number of applications on autism and attention deficit syndrome has been seen. In order to reduce the prevalence of psychological and psychiatric disorders in China, research topics are encouraged to illustrate the mutual interaction between environment and genetics and their impact on the development of these diseases, unravel potential etiologies, discover practical biomarkers in order to monitor development, progression and prognosis of the conditions, establish early diagnostic methods, and develop pharmaceutical and non-pharmaceutical methods for early intervention and treatment.

In recent years, applications for research in neurological diseases were predominantly on stroke, epilepsy and neurodegenerative diseases. In 2015, research on clinical application of neural stem cells and epigenetic on neurological diseases has increased obviously as well as studies focused on miRNA. However, most of the research was on follow-up analysis and lack of originality. The Division will continue to fund studies on rare genetic diseases in the nervous system, especially studies based on the molecular classification of individualized diagnosis and treatment. Studies using animal models such as non-human primates, *Drosophila* and Zebrafish will be encouraged. Although the number of applications for clinical study on cerebrovascular diseases has increased, clinical data collection on the involved studies was not standardized and lack of specification. Therefore, a unified strategy for carrying out clinical trials and data collection is required to strengthen the basic and clinical studies in early intervention, revascularization and functional recovery in stroke patients. The role of Vein in acute stroke, neurotrauma and neurodegenerative diseases is also a topic of central interest. Researches on the mechanisms underlying pain, especially chronic pain, need to be strengthened through the collaboration of basic and clinical studies. Studies on postoperative cognitive dysfunction and the mechanisms of general anesthesia have attracted great attention from anesthesiologists. The progress of this field is great after given high strength support in 2014 and 2015. In 2016, one or two

general program projects will continue to be generously funded to encourage research in this field. The Division hopes to balance its support among applications from neurology, neurosurgery, psychiatry and related fields such as pediatrics and anesthesiology. Clinicians and researchers in basic neurosciences are encouraged to jointly apply to perform significant investigation.

Gerontology (H25)

Funding scope mainly covers studies on pathophysiological mechanisms of aging and its related diseases. Studies on organ pathophysiological changes and common mechanisms of various diseases with respect to the aging process are encouraged and supported, including factors of genetic, metabolism, damage, stress, inflammation with organ function and the development of aging-related diseases; molecular mechanisms of stem cell senescence and its association with organ function and maintenance; the anti-aging effect and mechanism of calorie restriction, exercise, health management and other approaches. The overall goal of gerontology is to fund research that can advance the prevention, prediction, diagnosis, treatment, and prognosis of aging and its related diseases.

The Division does not accept applications concerning tumors, which should be submitted to the Division VII of Health Sciences (H16). Applications on diseases not related to aging mechanisms should be submitted to the appropriate Division.

Division IV of Health Sciences

The Division mainly supports basic research on reproductive system, perinatology, neonatology, and medical immunology.

Reproductive System/Perinatology/Neonatology (H04)

The Division mainly supports studies including: (i) abnormalities of the function and development of reproductive system, damage and repair of reproductive system, inflammation and infection of reproductive system, and reproductive endocrinological disorders, hereditary diseases of reproductive system, non-neoplastic diseases of reproductive system; (ii) oogenesis, spermatogenesis, fertilization, embryo implantation and fetal development, prenatal diagnosis, the structure and function of placenta and pregnancy related diseases; (iii) neonatal diseases; (iv) abnormalities of breast structure, function and development; (v) contraception, birth control and termination of pregnancy; (vi) female infertility and assisted reproduction, reproductive medical engineering; (vii) new diagnostic and therapeutic technology for the reproductive system/perinatology/neonatology.

The Division received 1,347 proposals in 2015, among which, 192 proposals are aimed at neonatal diseases, 172 proposals at pregnancy and pregnancy related diseases, 115 proposals at female reproductive endocrine disorders, 97 proposals at abnormal spermatogenesis and male infertility, 94 proposals at female infertility and assisted reproduction, 91 proposals at endometriosis and adenomyosis, 78 proposals at prenatal diagnosis of fetal development, 69 proposals at embryo implantation and early embryonic developmental abnormalities, etc. The hotspots such as genetic and epigenetic studies of reproductive system, the use of stem cell transplantation in treatment of reproductive diseases and new animal models for reproductive diseases, are all involved. However, proposals aimed at contraception, female sexual dysfunction, female hereditary diseases, female menopause, and the abnormalities of structure, function and development of mammary glands, are relatively less. Thus the Division will give special support to these

neglected research area in 2016. Besides, the Division will continuously encourages the basic research jointly proposed by basic researchers and clinicians aimed at the issues emerging from clinical practices.

Medical Immunology (H10)

The funding areas of this discipline cover basic and translational research in the following areas: (i) morphological, structural, functional and developmental abnormalities of immune cells, tissues, organs and immune system; (ii) mechanism underlying immune pathological process, immune regulation and tolerance, immunization, immunodiagnosics and immunotherapy of various diseases.

Key research directions and areas include: (i) new immune cells and their subsets, new immune molecules and signal transduction pathways, and their relevance to diseases; (ii) stem cell and immune system; (iii) in vitro differentiation and preparation of immune cells; (iv) the effect of epigenetic modification on immune cell differentiation, and its relevance to diseases; (v) the immune-metabolic cross-talk; (vi) the mechanism underlying the immune recognition responses effects by both innate and adaptive immune systems; (vii) immunologica research involving major key diseases, such as infectious diseases, inflammatory diseases, hypersensitive diseases, autoimmune diseases, immunodeficiency diseases, transplantation immunology and organ transplantation; (viii) research on the mechanism underlying vaccines and adjuvant.

Totally 858 applications for General Program were received in 2015, and many of these applications were focused on autoimmune diseases (343), inflammation and infection immunology (150), organ transplantation and transplantation immunology (81), and immune responsive factors and diseases (66).

The Division will continuously give special support to: (i) studies aimed at taking the advantages of establishing unique research systems or technical platforms (such as unique cell models or animal models, molecular targeting techniques, etc.) to understand the common mechanism underlying human immune-mediated diseases; (ii) studies aimed at taking advantages of the unique genetic or disease resources in China; (iii) systematic immunological studies that are intended to understand the immune-related features across various diseases spectrum by immunoinformatics, immunogenomics, immunogenome library and computational immunological techniques; (iv) collaborative studies aimed at scientific issues emerging from clinical practices by both basic and clinic researchers; (v) visualized studies of immune systems and immune response processes by newly developed real-time dynamic imaging techniques (MRI, PET, co-focal laser microscopy and living cells imaging, etc.), and single cell sequencing.

Tumor research areas of reproduction system are not covered in application codes H04, but in application code H16.

Division V of Health Sciences

Division V mainly supports the basic research in the field of medical imaging, biomedical engineering, medical aspects of specific environments, and forensic medicine.

Medical Imaging and Biomedical Engineering (H18)

Medical Imaging and Biomedical Engineering are featured by multidisciplinary intercrossing, such as the intercrossing between medicine and mathematics, physics, chemistry, information sciences, material sciences or engineering, and life sciences, etc. The Division supports basic and applied basic researches in areas of medical imaging and

medical engineering.

In the field of Medical Imaging, the basic research of medical imaging and its application to solve the scientific problems related to medicine is mainly funded, including magnetic resonance imaging (MRI), X-ray and computed tomography (CT), ultrasound in medicine, nuclear medicine, and interventional medicine, etc., functional and molecular imaging. Meanwhile, the explorative interdisciplinary studies in the scientific forefront of this field, including the areas of multimodal imaging, functional imaging, molecular imaging, precision interventional medicine, theranostic integration, medical image processing and analysis, imaging genomics, and translational medicine are also encouraged. In addition, the research of new imaging technology which can be applied in the early diagnosis, the early treatment, the prognosis, and the therapeutic effect evaluation of various diseases are also supported.

In the field of biomedical engineering, the Division mainly funds the research on medical engineering associated with disease prevention and early-warning, disease detection and diagnosis, disease treatment and rehabilitation, as well as the basic research related to regenerative medicine and nanomedicine, including biomedical signals, data processing and analysis of medical images, biomedical sensors, medical optics such as medical photonics and optical imaging, chips and micro-nano system, biomedical system modeling and information system, physical therapy, rehabilitation engineering, neural engineering and brain-computer interface, treatment planning and navigation technology, robot-assisted therapy, biomedical instruments and medical equipments, micro-nano-sensors and system, drug delivery materials and gene transfer systems, medical biomaterials, tissue engineering, regenerative medicine, artificial organ, and other scientific issues. Basic researches on brain imaging and intervention, implantable electromechanical system, biomanufacturing and 3D printing, biological micro electromechanical system, non-invasive and minimally invasive medical engineering technique, the treatment planning and navigation technology, robot-assisted therapy, new scientific equipment, cell/stem cell therapy, bioreactor of tissue engineering/construction, and biomaterial-induced tissue regeneration are also encouraged.

Medical Aspects of Specific Environments (H21)

Medical aspects of specific environments are aimed at the special health care needs of the population under different special environments, to solve various special medical problems in practice, and to provide theoretical support for major national strategic needs, the main purpose is understanding the physiological and pathological phenomenon and regular patterns of the human body in special environments on the level of molecule, cell and entirety. In this area, the Division mainly supports basic research on the resolve of pathophysiological phenomena and the prevention and cure of the diseases under the condition of aeronautical, astronautic, nautical, submarine, plateau, polar region and other special or extreme environmental conditions. The applications of the medical, chemical, biological, and modern engineering technologies for systematical research of the medical aspects of special environments are also encouraged. Internal disciplinary in the medical aspects of specific environments, interdisciplinary between the medical aspects of specific environments and biomedical engineering or other natural sciences are also supported. In the area of the issues of medical science and disease prevention and cure under special or extreme environments such as aeronautical, astronautic, nautical, submarine and plateau hypoxia, etc., the Division funded 1 application in high funding intensity in 2015, and in 2016, the Division will fund 1 or 2 applications in high funding intensity.

Forensic Medicine (H23)

In the field of Forensic Medicine, the Division mainly funds the basic research on resolving the biomedical identification problems in the judicial practice with the studies of human body and other relevant human biological samples. The funding fields mainly include the identification of cause of death, the estimation of postmortem interval and wound age; the pathophysiological changes caused by abuse and dependence of drugs and poisons, in vivo metabolic process of poisons; the forensic evidence associated with the evaluation of the degree of injury and damage, the identification of the level of disability and loss of the working ability; the objective evaluation of the legal capacity of persons with mental disorders; the individual characteristics determination (age, height, appearance), individual identification from difficult samples, the paternity identification, the tissue origin identification and ethnic origin identification. The profound and systematic research using the theories and techniques of physics, chemistry, biology, medicine, law and informatics, etc., is strongly supported. The researches of internal disciplinary in the forensic medicine and the interdisciplinary between forensic medicine and bioengineering, other natural sciences and even social sciences are also strongly supported, which will provide the clues to the case investigation, the scientific evidence for the case justice, the basis for the legislation of relevant laws and regulations.

The development of medical imaging and biomedical engineering has been accelerated by multidisciplinary studies. In 2015, there were total 1,144 applications in the areas of medical imaging, biomedical engineering, medical aspects of specific environments and forensic medicine, of which 236 applications were funded, the funding rate is 20.63%. The funding rate decreased slightly compared with 2014. Meanwhile, the number of applications in biomedical engineering, medical aspects of specific environments and forensic medicine increased, but it is still less than the number of application in medical imaging. To further promote the rapid development of medical imaging, biomedical engineering, medical aspects of specific environments and forensic medicine disciplines, the Division will continue to encourage multidisciplinary researches and cooperation between scientists with different scientific backgrounds. At the same time, preferential support will be provided to young investigators working in the interdisciplinary scientific frontiers mentioned above. To promote the developments of the medical aspects of specific environments and the forensic medicine, the applicants with different academic background are encouraged to explore the scientific issues in the 2 areas above.

The Division does not accept applications on radiation oncology or radiation prevention, which should be submitted to the Division VII (H16) or Division VIII in the Department of Health Sciences (H22), respectively. The applications on pharmacology and drug administration should be submitted to the Division IX (H30, H31) in the Department of Health Sciences.

Division VI of Health Sciences

The funding scope of Division VI covers basic researches in fields of biological characteristics and infection of bacteria, fungi, viruses, parasites and other pathogenic organisms, laboratory medicine, emergency and critical care medicine, trauma, burns, frostbite, plastic surgery, abnormalities and diseases of locomotor system, and rehabilitation medicine.

Medical Pathogens and Infection (H19)

The Division mainly supports basic research focused on the medical microbes and

parasites as the main pathogenic biological resources, including the pathogen biological characteristics and genetic variation, the infection and drug-resistance mechanism, the host immune response, the epidemiologic trends in nosocomial infection, the discovery of the medium and the physiological-ecological-behavior based on the sources and the routes of infection. Key scientific issues in the field of pathogenic organisms and infectious diseases are focused on the heredity, variation and drug resistance acquirement of pathogenic organisms and the host-pathogen interaction. The innovative basic research regarding the issues mentioned above and biomedical research relating to various types of pathogenic organisms, especially the new hair and neglected pathogenic organisms are highly encouraged. The project application about pathogenic microorganism, should strictly implement “Biological safety management regulations of pathogenic microorganism laboratory” issued by the State Council and rules about “ethics and biological security” drawn by relevant ministries; the application involves highly pathogenic microbes should submit the commitment from supporting institutions to assure biological safety.

Laboratory Medicine (H20)

The Division mainly supports researches on new theory, new technology, new methods and new markers for prediction, diagnosis, monitoring and prognosis of all kinds of diseases. The key-funding field includes the discovery and identification of sensitive and specific markers, the detecting techniques for personalized therapeutics, and the quality control, the reference methods and materials in measurement. Interdisciplinary researches are encouraged.

Emergency and Critical Care Medicine, Trauma, Burns and Plastic Surgery (H15)

The Division mainly supports scientific issues involving the pathophysiology, pathogenesis, diagnosis and treatment, and prevention in the field of emergency and critical care medicine, trauma, burns and frostbite, etc. In the field of plastic surgery, the funding mainly supports researches in wound healing and scar treatment, the defect and deformity repair, regeneration and reconstruction of superficial tissues and organs, and scientific issues related to medical cosmetology.

Abnormalities and diseases of locomotor system (H06)

The Division mainly supports the researches on the abnormalities in structure, function and development of the bone, joint, muscle and ligament, and the researches covering the etiology, pathogenesis, prevention, diagnosis and therapy of the diseases in locomotor system including the genetic diseases, the immune-related diseases, inflammation and infection, injury and repair, grafting and reconstruction, fatigue and recuperation, degenerative disorders, sports injury, deformity and correction, and non-neoplastic diseases. Meanwhile, proposals on the scientific issues arising from research on medical biomaterials of bone, joint and soft tissue are encouraged. The submitted proposals in 2015 were mainly focused on the damage and repair of bone, joint and soft tissue (H0605), and the degeneration of bone, joint and soft tissue (H0609); researches in intervertebral disc degenerative disease, osteoarthritis, and medical biomaterials are the hotspots in this field. In addition, 3D printing related research becomes more and more in recent years. Researches in fatigue and recuperation of bone, joint and soft tissue (H0608) and soft tissue diseases are few. The proposals of the mechanisms in new phenomena and new problems found in clinical and the continuous and innovative basic researches are also encouraged. In view of the relatively weak basis in research on sports medicine, this Division will give

more support to the relevant applications.

Rehabilitation Medicine (H17)

The Division mainly supports the researches on the mechanisms, clinical evaluation and therapy in the rehabilitation of dyskinesia and injuries caused by the diseases of locomotor system, nervous system or other relative organ/systems.

Without biological security commitment of the supporting institution or not conforming to the rules of the State Council and the relevant ministries, the applications involving highly pathogenic microorganism will not be granted. In addition, the applications on therapeutic drugs and pharmacology should be sent to Division IX (H30, H31) or Division X (H28). Pathogenic mechanism of molecules and temporal and spatial expression and regulation of genes should not be sent to laboratory medicine, so please apply it in other appropriate Divisions. Researches on drug-resistant pathogens should choose the code of Variation of Pathogen and Drug-Resistance (H1908). Researches that are not involved in the mechanism, evaluation and therapy of rehabilitation should not be sent to rehabilitation medicine, so please apply it in other appropriate Divisions. About tumor related applications, please see the general part of Department of Health Sciences.

Division VII of Health Sciences

The Division mainly funds basic research in oncology.

Oncology (H16)

We provide funding for cancer research involving common features of tumors in occurrence, development and progression, as well as the distinctiveness of tumors of various systems/organs in etiology, pathogenesis, diagnosis, treatment and prevention. The scopes of funding cover not only tumor etiology, tumor development, tumor genetics and epigenetics, tumor immunology, tumor prevention, recurrence and metastasis, tumor stem cell, tumor diagnosis, chemotherapy, physical treatment, biological treatment, comprehensive treatment of the tumor, tumor rehabilitation including social and psychological rehabilitation, new techniques of tumor research, but also tumors of various systems/organs (excluding hematologic system) which include respiratory system, digestive system, nervous system (including special receptors), genitourinary system, breast and endocrine system, bone and soft tissue, head, neck and maxillofacial region, skin, body surface and other parts of the human body.

The scientific goal of the Division is to emphasize the common features of tumors, which focuses on the molecular mechanism of tumor biology, such as proliferation, differentiation, metastasis, autophagy and apoptosis, thus to explore the mechanism and regularity of tumor occurrence, development, metastasis and recurrence, laying the foundation for tumor diagnosis, treatment and prevention. Also, we aim to highlight the distinctiveness of tumors of various systems and organs, and to promote the clinical practice in tumor diagnosis and treatment by carrying out translational research based upon clinical experiences and observation of specific systems/organs.

Proposals related to common scientific questions of tumor should select relevant application codes in tumor etiology, tumor occurrence, tumor genetics, tumor immunology, tumor prevention, tumor recurrence and metastasis, tumor stem cell, tumor diagnosis, chemotherapy, physical treatment, biological treatment, comprehensive treatment, rehabilitation (including social and psychological rehabilitation) and new techniques of tumor research. Proposals related to distinctiveness of tumor of specific systems/organs

should choose application codes of corresponding systems/organs. Application codes should be carefully selected in accordance with various scientific fields.

Oncology is one of the most active areas in medical sciences. With the rapid development and integration of cell biology, developmental biology, genetics and immunology, the trends of cancer research are steered towards tumor epigenetics, tumor stem cells, tumor immunology, and tumor systemic biology. Recently, research on cancer epigenetics has emerged as a rapid moving field, especially the studies of epigenetically regulated functional RNA in tumorigenesis and tumor progression. Additionally, study on the interaction between tumor cell and its microenvironment has gained increasing attention, for it emphasizes not only the regularity of microenvironment on tumor cell's biological property, but also the biological significance of tumor cell's effect on microenvironment. Moreover, aberrant cancer metabolism and its underlying mechanisms as well as its role in cancer biology have been appreciated, especially the reciprocal causality of metabolism and tumorigenesis and cancer development. Special interests have been aroused in the mechanisms of metabolic reprogramming of cancer cells and microenvironment, the association between specific metabolism of tumor cells and their biological behaviors, the roles of abnormal metabolites in oncogenesis and tumor development, and the crosstalk among different signal pathways in cancer cells. The other proposals have stressed the translational values of metabolic factors in tumor biology. For example, studies exploring *in vitro* and *in vivo* efficacy and mechanisms of agents regulating the metabolisms of glucose, lipids and nuclear acids in tumor cells may provide experimental evidence for the application of traditional drugs for cancer treatment. Studies probing the biology of tumor stem cells are making tremendous progress in recent years, which include the molecular mechanisms involved in maintaining the stem-cell like properties of tumor stem cells, abnormal metabolism of tumor stem cells, relationship between epithelial-mesenchymal transition (EMT) and tumor stem cells, formation and mechanisms of vascular mimicry, interactions between microenvironment and tumor stem cells, cancer cell dormancy, tumor heterogeneity, and resistance in therapy. Finally, tumor chemoprevention attracts more and more interest. By screening natural or synthetic compounds, new targets for cancer prevention and treatment were identified, reducing the incidence of cancer and improving survival for cancer patients.

In recent years, the quality of proposals in the field of oncology has been significantly improved, in terms of solid preliminary experimental data, scientific hypothesis based on sophisticated reasoning and complete and thorough studying items. Proposals derived merely through literature reviewing without preliminary experimental data, or descriptive and correlative studies are declining each year, and are lacking approval by reviewers.

Applicants are encouraged to conclude scientific questions from accumulated research findings or clinical practice, and to systemically investigate mechanisms for malignant tumors to improve cancer diagnosis, treatment, and clinical translation, as well as to develop new technology for cancer research. Integrated research proposals making the most of domestic clinical resources and focusing on common and high incidence tumors in the Chinese population are also encouraged.

Applicants should note that the proposals on tumor epidemiology should be submitted to the Division VIII of Health Sciences (application code: H26), and proposals of hematologic system tumor should be submitted to the Division I of Health Sciences (application code: H0818 in place of H1616). Proposals related to distinctiveness of tumor from specific systems/organs should carefully choose application codes of corresponding systems/organs. Proposals submitted in wrong application codes would be objected.

Division VIII of Health Sciences

Division VIII of Health Sciences provides funding for basic research in fields of skin and its appendages, endemiology, occupational medicine, radiology medicine, and preventive medicine.

Skin and Its Appendages (H11)

The funding scope mainly covers the basic research in the structure, function and dysplasia of skin and its appendages, as well as hereditary, autoimmune and inflammatory skin disease.

Radiology (H22)

Funding is given to basic research in radiation damage and repair, radiation toxicology and pathology, radiological hygiene and protection, and radiological therapy for non-tumor disease.

Endemiology (H24)

Funding is given to basic research regarding to the natural focal disease, biogeochemical disease and work-related or life style-related disease.

Occupational Medicine (H24)

Funding is given to basic research concerning diseases due to exposure to occupational hazards.

Preventive Medicine (H26)

The funding scope covers the basic research in environmental health, occupational health, human nutrition, food hygiene, maternal and child health care, children and adolescent health, toxicology, hygienical analytical chemistry, epidemiology of infectious disease, epidemiology of non-communicable disease, epidemiological methods and medical statistics.

With the severe increase and high threats to the public health, applicants should pay more attention to the pathogenesis and prevention of immune-related and infectious skin diseases.

Funding for radiology, endemiology, occupational medicine and preventive medicine will be mainly focused on research aiming at discovering new theory and developing advanced technology and methods for disease prevention and control. Projects with important scientific significance and original innovation are highly preferred. Investigators must focus on population based studies according to the actual demand of national population health and disease prevention. It is required to conduct the projects using integrated advance technology. A combined laboratory and field research is much more encouraged. Applicants should pay more attention to the multidisciplinary method, and look for a new growing point. In order to demonstrate our national characteristics and prestigious international standing, it is prerequisite to seek a novel research direction and to make great efforts in prospective research. Basic data accumulation and medical specimen collection will be encouraged in order to carry out in-depth, systematic study. The basic research in epidemiological cohort study is highly encouraged.

Tumor topics in the field of skin and its appendages are not accepted in Division VIII. These applications should be sent to Division VII (H1626). Division VIII does not accept applications for studying cancer radiotherapy. Applicants may refer to categories under

Division VII of Medical Sciences (H1610). Division VIII does not accept applications for medical imaging and radiological diagnosis. Applicants may refer to categories under Division V of Medical Sciences (H18). Applications for studying gynecologic diseases and pediatric diseases are not accepted. The former may refer to categories under Division IV of Medical Sciences (H04), while the latter depends on the classification of system characterization. Application of clinical test is not accepted under the category of hygienical analytical chemistry. Applicants may refer to categories under Division VI of Medical Sciences (H20). Applications of pure laboratory research are not accepted under the category of epidemiology. Application of hereditary disease without geographical features is not accepted under the category of endemiology. The criterion for selecting the category depends on the classification of system characterization. In addition, applications on drug toxicology will not be accepted, and applicants may refer to categories under Division IX of Medical Sciences (H31). Other issues in preventive medicine (H2612) do not accept applications for hygienical economics, hospital administration. Applicants may refer to categories under Department of Management Science. Also, applications for pathogen biology for infectious disease, as well as the pathogenesis, diagnosis and treatment will not be accepted. Applicants may refer to categories under Division VI of Medical Sciences (H19).

Division IX of Health Sciences

The Division IX mainly supports basic researches in the discipline of *Materia Medica* and Pharmacology.

Materia Medica (H30)

Funding granted in the discipline of *Materia Medica* cover research areas or sub-disciplines including Medicinal Synthetic Chemistry, Natural Products Chemistry, Microbial Medicines, Marine Drugs, Biotechnological Drugs, Special Medicines, Drug Design and Drug Informatics, Pharmaceutics, Pharmaceutical Materials, Pharmaceutical Analysis, Drug Resources, and other scientific issues related to *Materia Medica*.

Projects supported in the discipline of *Materia Medica* mostly focus on interdisciplinary and basic researches of drugability. Funding granted in Medicinal Synthetic Chemistry, Natural Products Chemistry, Microbial Medicines and Marine Drugs mainly support researches on innovative theories, technologies and approaches for structural modification and synthesis of compounds with potential to be developed into new drugs, and also for drug discovery from terrestrial or marine plants, animals and microorganisms. Funding granted in Biotechnological Drugs mainly support researches on innovative biotechnologies or approaches to obtain therapeutic antibodies, vaccines, proteins, nucleic acid drugs, cells, etc., while exploratory researches on new types of expression systems and large scale culture techniques will be supported reasonably. Funding granted in Special Medicines support drug researches related to aeronautics, astronautics, deep sea, radiations, militaries, special environments, etc. Funding granted in Drug Design and Drug Informatics support researches on innovative theories or approaches for drug design and safety prediction by applying principles of drug design, computer-aided drug design, pharmaceutical informatics on the basis of Biomedicine, Systems Biology, Structural Biology, Chemistry and Pharmacological principles (such as ADME and drug transporters). Funding granted in Pharmaceutics support researches on innovative theories, technologies and evaluation methods, which are associated with Physical Pharmacy, Biopharmaceutics, Molecular Pharmaceutics, Novel Drug Delivery Systems and Pharmaceutical Dosage Forms. Funding

granted in Pharmaceutical Materials mainly support basic researches on establishment and safety evaluation of new pharmaceutical excipients and carriers, which should have owned prominent features and can be distinguished from researches in the area of pharmaceuticals. Funding granted in Pharmaceutical Analysis mainly support basic researches on establishment and development of innovative analytic approaches and techniques aimed at solving key scientific problems in the field of Materia Medica and Pharmacology. Researches characterized with multi-disciplines coordination, such as in the fields of “-omics”, Drug Metabolism (ADME) and Pharmaceutical Analytical Informatics, should mainly focus on innovation of analytic approaches. To establish the novel theories and methods used for in vitro and in vivo detection of biotechnological drug, polysaccharides and bioactive molecules are also encouraged. Funding granted in Drug Resources mainly support researches on key scientific problems associated with discovery, exploration, sustainable utilization and protection of new pharmaceutical resources.

Pharmacology (H31)

Funding granted in the discipline of Pharmacology support researches on drug action mechanism or drug resistance mechanism, Drug Metabolism and Pharmacokinetics, Clinical Pharmacology and Drug Toxicology, etc., the involved drugs should be therapeutic drugs or drug candidates or bioactive substances with some advantages in treatment of diseases.

In the discipline of Pharmacology, projects should mostly focus on in-depth study on action mechanism of drugs or bioactive products including exploring the basic rule of life and the pathologic mechanism of disease by using drug molecules as probes. In addition, in-depth and systematic studies should be strengthened in proposals related with research fields as below: discovery and validation of new target or molecular biomarker, strategies and methods to effectively overcome multi-drug resistance, targets and mechanisms of new types of bioactive compounds, quantitative pharmacology and systemic pharmacology, drug epigenetics, etc. Basic research should be strengthened in proposals related with research fields as below: molecular regulatory network of complex disease and drug intervention, individualized drug therapy, new treatment approaches, new use of old medicine, translational medicine, innovative pharmacological models and disease models. In the sub-discipline of drug metabolism and pharmacokinetics, new approaches and new models should be constructed and developed to strengthen the researches on molecular mechanism involved in the research areas of pharmacodynamics, toxicology, clinical medication and drug intervention. To better understand drug efficacy and toxicity in molecular level, the researches on distribution and metabolism of drugs in cells and even subcellular organelles should be strengthened. To better understand profiles of biomacromolecular drugs in vivo distribution, metabolism, elimination, and their relationships between pharmacokinetic, pharmacodynamic and toxicity, the researches on pharmacokinetic analysis methods to sensitively, exclusively and accurately detect biomacromolecular drugs, such as monoclonal antibody drugs and antibody-conjugated drugs, should also be strengthened. In the sub-discipline of drug toxicology, researches should be strengthened in the research fields as below: molecular toxicology, mechanism on genetic toxicity and reproductive toxicity, mechanisms on metabolite toxicity, new models and new approaches for drug safety evaluation. The researches and clinical applications of gene polymorphism, microRNA, posttranslational modification of protein and small molecule metabolites used in the early stage of screening of drug toxicity, the discovery of toxicity biomarker and toxicity action mechanism should be strengthened.

In recent years, a large proportion of proposals in the discipline of Materia Medica were from sub-disciplines of Pharmaceutics, Medicinal Synthetic Chemistry, Natural Product

Chemistry, in which, many proposals were involved in antitumor drug research and nanocarrier design. The research fields should be expanded and the research contents should be in-depth and innovation, meanwhile, crosslink between Life Sciences, Medicine, Chemistry, Physics, Mathematics, Control Science and Pharmacy should be strengthened in the proposals. It is necessary to expand research directions to various diseases. Rare disease (orphan disease) and the often ignored diseases should be emphasized. The researches on the druggability of delivery systems and new compounds should be emphasized. In the discipline of Pharmacology, most proposals mainly focus on drug action mechanism or drug resistance mechanism, some special projects based on long-term accumulation could be founded; however, most studies on mechanism were still limited to the description of biological effects of drugs, and fewer proposals were focused on the discovery of new target, validation of new target and in-depth study on molecular mechanism. Some proposals with good research idea failed to be approved due to inadequate data, insufficient evidences, oversized research plan, insufficient study in depth, ambiguous research objects and incomplete scientific logic, etc. A few of proposals were not granted for lack of innovation or too simple without any preliminary data.

Innovative or continuous in-depth research projects will be granted in priority. Because translational medicine is of far reaching significance in improving clinical application value of basic research, laboratory basic research on discoveries of new drug, clinical therapeutics and diagnostics will be strengthened to reveal new targets for drug therapy, new biomarkers for disease diagnostic in the course of exploring the mechanisms on occurrence and development of disease, furthermore, to lay theoretical and experimental foundation for developing innovative drugs and diagnostic reagents with independent intellectual property.

The scopes of funding do not cover conventional researches for drug development and pharmaceutical process for new drug approval. Usually, the entire chemical structures or backbone of compounds should be provided in application, but the applicants should pay special attention to the protection of intellectual property and carefully handle the relationships between application and secrecy. Confidentially core contents or techniques, which are not suitable to illustrate or describe in proposals such as chemical structures, should be sent directly to the office of Division IX by confidential letters and explained in proposals.

Division X of Health Sciences

The Division X of Health Sciences identifies its role as advancing the theories of Traditional Chinese Medicine while highlighting its advantages. It provides funds to basic research programs in Traditional Chinese Medicine (TCM), Chinese Materia Medica (CMM) and Integrated Chinese and Western Medicine (IM).

Traditional Chinese Medicine (H27)

Funding areas: (i) Fundamental theories of TCM: Essence of Viscera, Qi, Blood and Body Fluid, Body Constitution, etiology and pathogenesis, basis of TCM Syndromes, Therapeutic Principles and Methods, Prescriptions of TCM, and Diagnostics of TCM; (ii) Basic research in clinical medicine: Internal Medicine of TCM, Surgery of TCM, Orthopedics and Traumatology of TCM, Gynecology of TCM, Pediatrics of TCM, Ophthalmology of TCM, Otorhinolaryngology of TCM, Stomatology of TCM, Geriatrics of TCM, and Health Preservation and Rehabilitation of TCM; (iii) Acupuncture and moxibustion, Tuina and massage: Meridians, Collaterals, and acupoints, acupuncture, moxibustion and Tuina and massage; (iv) Other ethnomedicine.

Chinese Materia Medica (H28)

Funding areas: (i) Chinese Materia Medica: Resourceology of CMM, Identificology of CMM, pharmacodynamic material basis of CMM, quality evaluation of CMM, processing of CMM, pharmacodynamics of CMM, and theories about the properties of Chinese herbs; (ii) Pharmacology of CMM: neuropsychopharmacology of CMM, cardiovascular and cerebrovascular pharmacology of CMM, anti-tumor pharmacology of CMM, endocrine and metabolic pharmacology of CMM, anti-inflammatory and immune pharmacology of CMM, antiviral and anti-infective pharmacology of CMM, respiratory pharmacology of CMM, digestive pharmacology of CMM, urinary and reproductive pharmacology of CMM, pharmacokinetics of CMM, and toxicology of CMM; (iii) Ethnopharmacology.

Integrated Chinese and Western Medicine (H29)

Funding areas: (i) Fundamental theories of IM; (ii) Basic clinical research of IM; (iii) Methodological or technical innovations in TCM research.

In recent years, funded projects in the field of TCM, CMM, and IM have the following features: (i) using TCM theory as the guidance and establishing clinical efficacy as the fundamental goal, these projects were generally conducted from both macroscopic and microcosmic levels, focusing a multilayer in-depth research including the whole-system, organ, cell and molecule levels, and exploring the wholeistic rules of human life activity and the integrating regulatory effects of TCM; (ii) these projects particularly emphasized on introducing cutting-edge theories, methods and techniques in the medical and other fields of modern science, incessant innovation of research thoughts and methods, dynamic integration of TCM and new emerging disciplines (such as systematic biology, network pharmacology, evidence-based medicine, and translational medicine) in terms of theory and research thought, which is one of the major driving forces for the development of TCM discipline; (iii) these projects also paid a great attention to the research of preponderant diseases treated by TCM and ethnomedicine (such as functional disease, immunological disease, neurodegenerative disease, complications of disease) and to identify its therapeutic mechanisms.

The Division's top priority is to support the best project proposals of basic research, continuous in-depth projects, and continues to encourage the integration of different disciplines. It has been emphasized that every interdisciplinary collaborative research using multidisciplinary concepts, methods, techniques and approaches must be conducted under the guidance of TCM theory and in an effort to promote the inheritance, development, and innovation of TCM fundamental theories. In light of the current TCM research situation, this Division will continue to value and support researches on the following aspects: Visceral Manifestation Theory; TCM syndromes; etiology and pathogenesis; therapeutic principle and method; basis of TCM treatment for its preponderant diseases and the preventive and therapeutic effects on major and refractory diseases; correlation between classical formula and disease-syndrome; basis for the Theory of Channels, Collaterals and acupoints, and the acupuncture treatment and prevention of disease; theoretical and clinical basis for traditional Chinese and western medicine integration; TCM innovative technology and method research; CMM resources; CMM identification; CMM processing and preparation; CMM property; material basis for efficacy, physiological disposition, and mechanism of CMM; CMM toxicity; correlation between toxicology and toxic-effect; and ethnomedicine.

A project proposal submitted to the Division needs to focus on the seamless integration with TCM theory, avoid implementing a mechanism research that is not clinical efficiency-oriented, or withstand the tendency of blindly using advanced and new

technology.

Any proprietary contents or techniques such as ingredients of a TCM formula and the names of acupoints, which may be inconvenient to disclose in the application should be sent to the Division directly by confidential mails, and should be explained in application documents.