

Programs of Joint Funds

The joint funds set up by NSFC and other relevant government departments, provincial governments and industrial sectors aim at playing a better guiding role of the National Natural Science Fund to attract resources from different sectors to support basic research in specific areas and directions.

The joint funds focus on national interests and key directions of scientific developments, attract nationwide researchers to conduct basic research in relevant areas, solve key scientific problems, promote cooperation among industrial sectors, universities and research institutes, foster scientific and technological talents, and enhance Chinese indigenous innovation capabilities in relevant areas, industries or regions.

In 2013, the joint funds in the *Guide to Programs* include NSAF Joint Fund, Joint Fund of Astronomy, Joint Fund of Research on Major Science Facilities, Coal Joint Fund, Iron and Steel Joint Fund, Civil Aviation Joint Fund, Joint Fund of Petroleum and Chemical Engineering Research, NSFC-Guangdong Joint Fund, NSFC-Yunnan Joint Fund, NSFC-Xinjiang Joint Fund, NSFC-Henan Joint Fund, and Joint Fund for Promoting S&T Cooperation across the Taiwan Strait.

The joint funds form a part of the National Natural Science Fund system. The joint funds are managed according to NSFC's regulations and project selection procedures. When, at any time during or after completion of a project, the researcher or any other party publishes or produces material such as papers, books, reports, software, patents and awards which relate to the research project, NSFC's contribution and support of the project should be acknowledged in a prominent place and in an appropriate form. The acknowledgement should include the mention of NSFC and its partners as funding bodies, the name of the joint fund, the project number or relevant statements.

Applications for the joint funds should be prepared according to relevant project type (such as General Program or Key Program) outlines. Please select "Joint Fund" for funding category, "Fostering Program Project" or "Key Program Project" or "Fostering Local Talents" for sub categories, and select the name of the joint fund in the notes section. Applications without

correct selection will not be accepted.

In 2013, the funding intensity for all joint funds will be increased moderately, and the funding period will remain unchanged, namely, 3 years for Fostering Program Projects and 4 years for Key Program Projects. The requirements of the limit on the total number of NSFC projects that one PI may apply or undertake apply to the joint fund program. For more details, please refer to the relevant requirements in the *Guide to Program*.

NSAF Joint Fund

Jointly set up by NSFC and the China Academy of Engineering Physics (CAEP), the Fund is aimed to encourage scientists in related fields to carry out basic and applied researches for national security, so as to explore new research directions, discover new phenomena and laws, upgrade the innovative ability of science and technology in national defense, and foster young professionals in this area.

The budget for this fund in 2013 is 46 million yuan, which means a significant increase of the average funding scale. In 2013, it is planning to fund two types of projects, namely, “Key Program Projects” and “Fostering Program Projects”. Key Program project has three directions, with average funding of 3-4 million yuan per project for 4 years. There are 3 encouraged research directions for Fostering Program Project, and 47 projects with defined targets are planned for funding with an average funding of 800,000 yuan per project for 3 years. For more detailed information, please refer to NSFC website (<http://www.nsf.gov.cn>) or contact the administration office of the NSAF Joint Fund.

I . Directions for Key Projects

1. Research on multi scale structural evolution and effect of PBX under wide temperature thermal dynamical coupling
2. Research on macro quantum effect in artificial micro structures
3. Study on optimization of super conductive quantum bit and mixed quantum devices

Note: CAEP Researchers can apply for or participate in applying for this program. Collaboration among two or three institutions is encouraged.

II . Directions and Projects for Fostering Program Projects

1. Projects for encouraged research directions

- (1) Damage analysis and modeling of polymer bonding explosives under external loading
- (2) Characterization of metal interface state and effect on behaviors of material under strong dynamic loading
- (3) Studies on response properties of and laws of piezoresistive micro-accelerometers under severe dynamic loading

Note: CAEPresearchers are not eligible to applyingfor or participating in projects for encouraged research directions.

2. Projects with defined targets

- (1) Micro structure evolution of dynamic stretch fracture of ductile metal
- (2) Mechanism of killing bio target by low additional kill effect
- (3) Experimental and theoretical research on constitutive relations of Ti/Ni alloy
- (4) Characterization of internal micro structures of explosives and its impact on impact sensitivity
- (5) Study of the anti-penetration performance of new ceramic composite structure
- (6) elastic constitutive model of metal materials based on micro structure evolution
- (7) topological optimization method under dynamic response of continuum structure
- (8) Modeling and algorithm of compressible turbulent metal particle transport
- (9) Research and application of parallel multilevel grid method for hetero multi grid computer system
- (10) Numerical simulation of mesoscopic mechanical behavior in pressing process of PBX explosive powder
- (11) Health evaluation of complex leveled system for information process based on mixing uncertainty
- (12) Studies on mechanism of mechanical relaxation of self-adaptive fiber
- (13) Super microscopic studies on laws of evolution of heat induced stress defect of KDP crystals
- (14) Electromagnetic modeling and fast algorithm in large complex environment
- (15) Theoretical studies on photoelectric reduction and excitation process in shell layer within atoms and molecules

- (16) Effect of major nuclide on uranium state in fracture solution after radiation by low condensed uranium
- (17) High pressure phase change and physical properties of cerium
- (18) Burning resistance and strengthening of packaging materials of epoxy by melamine cyanurate
- (19) Studies on high pressure energy storage and mechanism of large current pulse discharge of anti-ferroelectric ceramic materials
- (20) Regulation and properties of large dislocated highly nonlinear low delay piezoelectric ceramics
- (21) Studies on damage mechanism of media membrane on cavity surface of laser devices
- (22) Studies on multichannel super narrow line width laser amplification and control technology
- (23) Studies on key problems in large aperture nonlinear crystal combination technology
- (24) Theoretical studies on reverse field configuration plasma static conical sleeve compression
- (25) Studies on the mechanism and key technology of transient transport of pressure controlled semiconductor high power switch
- (26) Studies on the properties of strong pulse emission of carbon-diamond composite cathode
- (27) Studies on the damage mechanism by high voltage pulse of high insulation strengthen zinc oxide
- (28) Studies on guidance technology by highly dynamic super close combination of inertia/satellite
- (29) High resolution 3-D imaging technology for space targets using micro motion analysis
- (30) Studies on detecting material trap distribution and control technology using photo induced radiation
- (31) Studies of time resolution spectrum of molecular excitation state energy relaxation process
- (32) Research on mechanism of removing inter-level materials in super precision cutting of KDP crystals
- (33) Studies on preparation and mechanism of formation of highly ionized magnetic controlled sputtering membrane
- (34) Studies on molecular design and synthesizing mechanism of new types of low melting point nitrogen heterocyclic energy containing compound
- (35) Studies on the design and mechanism of new types of room temperature solidifying agent system
- (36) Studies on controlled synthesis and lithium embedding performance of

- 3-D super structure carbon alkenyl composite materials
- (37) Studies on mechanism of energy containing chips based on membrane heater and nano energy containing material
 - (38) Studies on molten salt loading mechanism of nano porous magnesium oxide fiber
 - (39) Studies on super hydrophobic self-repairing anticorrosion coating and mechanism of its corrosion resistance
 - (40) Studies on gas dynamic characteristics of multi state flow in variable cross sectional narrow tube
 - (41) Response characteristics and induction mechanism of impact by fractures from metal fluorine polymer reaction
 - (42) Studies on single energy imaging technology by soft X-ray of ellipsoid surface crystal
 - (43) Studies on method of optimizing electromagnetic nano positioning of multi freedom
 - (44) Composite ray measuring method for surface density distribution on 2-D nano metallic membrane without support
 - (45) Studies on technology of generating rectangular pulse by variable pulse chirp
 - (46) Studies on stress release mechanism of under thermo effect of high energy laser membrane of anisotropic base
 - (47) Research on preparation and basic physical properties of cerium crystals

Note: CAEP researchers are not eligible to applying for or participating in projects with defined targets.

Please refer to separate publications or the CAEP website (<http://www.caep.ac.cn>) for detailed information on specific content and form of research results, etc.

Joint Fund of Astronomy

NSFC and the Chinese Academy of Sciences (CAS) jointly set up the Joint Fund of Astronomy, which opens to all universities and research institutions in China (especially non-astronomy research ones), combine NSFC's strength in evaluation, funding and management with the function and roles of the national research platforms (observation bases) in astronomical fields that have already been established by Chinese Academy of Sciences. This combination will promote the effective use of these facilities to conduct

astronomical research by researchers in universities and other research institutions, extend areas of space astronomical research, foster research talents in related areas, improve innovation capabilities and academic positions internationally, and make astronomical research in China better serve the national strategic needs.

The Joint Fund of Astronomy includes “Fostering Program Project” and “Key Program Project”. Key Program Project will not specify project titles and applicants may decide their project titles, research contents, research schemes and research funding according to the following 1-5 important scientific issues. The sixth issue is not within the scope of Key Program Project. In 2013, the Joint Fund of Astronomy plans to fund about 4- 6 Key Program projects.

As a part of the National Natural Science Fund, the application, evaluation and management of the Joint Fund of Astronomy comply with the regulations of NSFC and the agreement signed between NSFC and CAS. In 2013, the funding will be arranged about 25 million yuan in total. There will be a moderate increase in the funding intensity. For the Fostering Program Project, the average funding will be about 600,000 yuan per project for 3 years, and for Key Program Project, the average funding will be about 2.5 million yuan per project for 4 years.

Funding Areas in 2013

- (1) Scientists from research institutions and universities outside CAS astronomical observatory system to use optical, radio, infrared observation facilities and data to conduct observation and theoretical research on cosmology, galaxies, stars, the sun and solar systems and other basic astronomical areas (Researchers in CAS astronomical observatory system are not allowed to apply as PIs, but may participate in the research as principal members of the research group.).
- (2) Research on observation techniques in space, including new observation techniques, new methods in space and pre-studies on key techniques of astronomical satellite, etc.
- (3) High energy, ultraviolet, optical, infrared and radio techniques related to astronomical observations, including high energy X, gamma imaging technology, high resolution detector technology (position resolution and energy resolution) and polarized measurement, the detection of weak photoelectric signals, storage and transmission techniques, high energy, optical, infrared and radio techniques related to astronomical telescopes,

- automated control techniques and machinery, etc.
- (4) Applied basic research on problems in major astronomical projects such as data, computation and information access, etc., including storage and sharing of mass astronomical data, data mining, high performance computation and virtual observatory techniques.
 - (5) Basic astronomical methods and key scientific issues originated from national strategic needs.
 - (6) Analysis research on frontier scientific areas in large astronomic observation facilities, those are under construction or planned, for providing scientific knowledge on the facilities. Specific contents include the selection and verification of frontier scientific problems and scientific goals, selection and optimization of observation model and strategy, selection of specific observation objects, processing of observation data and information acquisition, error analysis and control, and the development of observation experimental simulation and theoretical models (only Fostering Projects are accepted in this area).

Joint Fund of Research on Major Science Facilities

NSFC and the Chinese Academy of Sciences (CAS) have jointly set up the Joint Fund of Research on Major Science Facilities, which aims at making use of NSFC's strength in evaluation, funding and management to attract researchers in universities and research institutes to conduct frontier, multidisciplinary and intercrossing researches by using national major science facilities built by the CAS, foster research talents of major science facilities, develop new research directions, bring into full play the overall capability of these major science facilities, promote the exchange and opening up, upgrade our innovation capability in basic science and creativity in frontier science areas and improve international standings of China, and make Chinese basic research better serve the national strategic needs.

As a part of the National Natural Science Fund, the application, evaluation and management of the Joint Fund of Research on Major Science Facilities comply with the regulations of NSFC and the agreement signed between NSFC and CAS. The major science facilities referred to in this joint fund are BEPC and BES in Beijing, HIRFL-CSR in Lanzhou, SSRF in Shanghai, and NSRL and SHMFF in Hefei.

The Joint Fund of Research on Major Science Facilities includes “Fostering

Program Project” and “Key Program Project. In 2013, the total funding of 60 million yuan will be arranged with 30 million yuan for Key Program Projects and 30 million yuan for Fostering Program Projects. The average funding for a Key Program Project is about 3 million yuan per project for 4 years and that for Fostering Program Project is about 700,000 yuan per project for 3 years.

I .Three Major Funding Areas

- (1) Research using general equipment, focusing on multi-disciplinary research in physical sciences, information sciences, material sciences and environmental sciences, etc. and the development of new research directions.
- (2) Research using special devices, such as high energy physics research on BESIII and nuclear physical research on HIRFL-CSR in Lanzhou.
- (3) Research on techniques and methods that improve the experimental capability of major facilities and the development and key technology for small specialized devices.

II . Priority Research Areas in 2013

Fostering Program Project

Multidisciplinary research on synchrotron radiation in physics, chemistry, life sciences, medical sciences, environmental sciences, material sciences, geology, agriculture, metrology, microelectronics and micromechanics; experimental studies on τ -charm physics on BESII and basic research on relevant software and data analysis; nuclear physics experimental studies on HIRFL-CSR in Lanzhou and applied basic research on heavy ions; studies on ion beam in life sciences, medical sciences, material sciences and semiconductor defect engineering, etc.; new principles, new technology and methodology of beam line; particle accelerator and key technology, method and equipment for particle detectors, magnetic resonant technology and new method of preparation for functional materials in steady high magnetic field.

Key Program Project

Research areas are more than funded projects in number, applicants may decide the project title, research content and research scheme according to their own situation. It is encouraged that applicants collaborate with researchers working in labs of facilities.

1. Research on scientific problems based on Synchrotron Radiation Facility

- (1) Transit and transfer process of environmental pollutants
- (2) Structure and property of advanced materials
- (3) Electronic structure and magnetism of complex materials
- (4) Structure and functions of large bio molecules
- (5) Process and function of thermal decomposition of fuel
- (6) Fine analysis of important minerals

2. Research on scientific problems based on Steady State Strong Magnetic Field Facilities ($\geq 20\text{T}$)

- (7) Correlated materials in steady state strong magnetic field conditions
- (8) Studies on drug selection and functions in steady state strong magnetic field conditions
- (9) Bio chemical properties and mechanism under high magnetic field NMR

3. Frontier physics and expanded studies based on BEPCII and HIRFL

- (10) Physical research on charmonium
- (11) Properties of singular nuclei and nuclear matter
- (12) Highly ionized ion and fine spectroscopy
- (13) Heavy ion radiation effects

4. New principles, new methods and key technology for the facilities

- (14) New method and new technology of CSR experiments
- (15) Experimental method, key technology and devices for beam station
- (16) New theory and methods of imaging
- (17) New principles, new methods and new technology and key components for accelerator
- (18) Key technology of detector and electronics
- (19) Method and software of experimental data analysis and processing
- (20) Self (ferro magnetic) resonance method in strong magnetic field
- (21) New theory and key technology of advanced light sources

Joint Fund of Coal Research

The Joint Fund of Coal Research was set up by NSFC and Shenhua Group Corporation Limited (Shenhua Group in short hereinafter). The first phase is 3 years (2011-2013) with budget of 150 million yuan. This Joint Fund aims closely at major problems and strategic development of Chinese coal, thermal power, coal chemical engineering, new energy industries, and supports fundamental, foresighted and innovative research, promotes the integration of knowledge innovation and technological innovation, fosters

S&T talents and improves the competitiveness of Chinese coal and related energy industries.

This joint fund is open to all researchers in China, and mainly supports basic research in coal development and utilization.

- (1) Coal development: coal mining, production safety, utilization and preservation of mining resources, coal quality improvement, and coal-bed gas development, etc.
- (2) Coal utilization: thermal power, clean coal conversion, energy conservation & emission reduction and related new energy areas.
- (3) Research project which having important scientific merit and practical value with the background of coal science development.

The Joint Fund advocates interdisciplinary research and the synergy of industry, university and research, gives priorities to young talents, encourages applications from non-coal universities and research institutes, and encourages further joint funding from other sources. In 2013, this joint fundis planning to arrange about 49 million yuan. According to the number of applications and peer review, around 10~15 “Key projects” will be supported, with a budget of 2.4~3.0 million yuanper project for 4 years; about 30~50 “Fostering Project” will be supported, with a budget of 400~700 thousand yuanper project for 3 years.

As a part of the National Natural Science Fund, the project application, evaluation and management of this the Joint Fund will follow the regulations of NSFC. NSFC and Shenhua Group manage this joint fund jointly, and the Department of Engineering and Material Sciences is responsible for applications and evaluations.

I . Funding Directions of Fostering Program Project in 2013

1. Safety in coal mining

- (1) Mechanism of spontaneous combustion and burning area probing technique for Jurassic Period coal seam in underground mining
- (2) Mechanism of inrush of pressure-bearing Ordovician-limestone-water
- (3) Basic theory of mine inflow calculation of giant coal mine
- (4) Basic technique of wireless communication which can penetrate rock seam and human accurate positioning
- (5) Research on sensitive factors and determination method of coal-gas outburst for mining area in west China

- (6) Basic technique of remote warning for serious hazard in coal mine
- (7) Key technique of real time multi-grade network security for digital mine
- (8) Monitoring method of situation for large scale electromechanical equipment in coal mine
- (9) Key technique of safety detection of comprehensive protecting on mining conveyor

2. Coal mining

- (1) Theory and method of optimization of safe, efficient mining system
- (2) Theory of hydraulic support and wall rock coupling in coal face in western coal mines
- (3) Basic theory for high end hydraulic supporting
- (4) Technical optimization of gear drive of mining machine
- (5) Basic technique of Wanggewili mining method in shallow coal mine

3. Eco environment in mining area

- (1) Water conservation mining method in eco fragile mine area
- (2) Mining impact rules to ground ecology and forecasting method in eco fragile mine area
- (3) Basic processing technique to coal slime in coal washery

4. Mine construction

- (1) Reliability of drilling by frozen method in special geological conditions in the northwest regions
- (2) Reliability of drilling by boring method in special geological conditions in the northwest regions
- (3) Surrounding rock classification and optimizing supporting design of TBM in roadway (incline shaft)

5. Basic research about efficient & cleaning Coal-fired power generation technology

- (1) New technique, new process of desalination of sea water in coal-fired power plant
- (2) Oxygen enrichment burning of typical steam coal and pollutant generating features
- (3) Basic technology of hydrogen enrichment gas turbine
- (4) Basic technology of Composite power compound with solar thermal power and firing power
- (5) Basic theory of blended with biomass in coal-fired power plant
- (6) Mechanism of corrosion and pollution to boiler affected by high chlorine and alkalis coal which were native to Hami and Huaidong Xinjiang

6. Basic technology of safety and operation of thermal power generation

- (1) Reliability of the automatic control system for large thermal power plant which use the data bus technology
- (2) High-temperature materials welding performance of ultra-supercritical generating set

7. Energy saving and emission reduction of thermal power units

- (1) Synergistic removal of flue gas pollutants and resource utilization in coal-fired power plant
- (2) Control technique of ultrafine particulate emission of coal-fired

8. Basic research on clean coal processing and comprehensive utilization

- (1) Multiphase reactor and reaction in the process of coal-to-oil
- (2) Level gauging method of coal and other solid materials in high temperature and high pressure reactor
- (3) High-performance electrode of coal-based carbon quality
- (4) Affects mechanism of microbial activity in the biochemical process of wastewater emitted in the process of coal direct liquefaction
- (5) Research on the physical and chemical character of propellant that make up from hydrogenation of coal liquefaction
- (6) Drift mechanism in the process of coal directly liquefaction
- (7) Separation technology of the active maceral in low-level bituminous and the low of its coking coal blending
- (8) Extraction of gallium in high alumina fly ash and mechanism of product hydrogen from aluminum gallium alloy
- (9) Basic theory of slime drying technology

9. Key technology for heavy haul railway transportation

- (1) Running 20,000 tons long and big train under the axle load of 30 tons and above
- (2) Monitoring system of running status for
- (3) Optimizing of dispatch system for heavy haul train
- (4) Intelligent collaborative control system for over locomotive heavy haul train

10. Kinetics of heavy haul train and basic technology of communications

- (1) Wheel-rail interaction of heavy haul train
- (2) Theory and methods of communication security for heavy haul train

11. Kinetics of heavy-load train and basic communicational technology

- (1) Wheel rail relation of heavy-load train
- (2) Security theory and method for heavy-load train

II. Funding Directions of Key Program Project in 2013

1. Basic technology of shale gas mining in coal measure strata

Research on the reservoir, migration and accumulation mechanism of shale gas in coal measure strata, and the main controlling factors of reservoir and accumulation mode; shale gas migration law in coal measure strata and the evolution law of rock fracture in the mining process; testing technology and its principles of shale gas stratum, principles and methods of mining technology, economic evaluation and methods of mining technology.

2. Mechanism and basic control technology of disaster lead by ventilation system thrashing in large-scale coal mine

Research on the identification method of the key link of large mine ventilation system, failure mechanism of ventilation system effected by the gas, spontaneous combustion, coal dust and other factors, and the establishment of a closed loop feedback methods of ventilation system failure prevention to improve the reliability of large-scale coal mine ventilation system.

3. Basic theory and technology of control spontaneous combustion of close range coal seam group mining at shallow buried

Studies on gas distribution characteristics in overlying goaf and the spontaneous combustion rule during close range coal seam group mining at shallow buried; the relationship between overlying rock strata and pillar deformation, migration and failure characteristics and spontaneous combustion of coal during lower coal seam mining; secondary oxidation characteristics and spontaneous combustion index gas generating law in overlying coal seam goaf gas drainage and pumping process; leakage law in upper coal seam goaf and lower the coal face and the upper and lower seam goaf spontaneous combustion risk criteria and control methods.

4. The green mining theory and its application of large opencast coal mine

Dynamic spatial and temporal evolution in the opencast coal mine great quantity coal crag preparation, loading, movement, abandonment; the orderly dynamic process of technology, processes and temporal and spatial relations between open-pit coal mining stripping engineering and ecological environment reconstruction, the integration of theory and technology of

opencast coal mine stripping production and mine ecological environment reconstruction, Establishment of theoretical system of green mining in large open pit coal mine and evaluation system of technical and economic indexes.

5. Overlying rock strata formation and safe mining during fully mechanized top coal caving process

Studies on fully-mechanized top-coal broken mechanism, loose top-coal movement rule, different top-coal and rock lumpiness mechanical properties and movement laws in overlying rock strata structure fully mechanized top coal caving mining process; study the basic theory of surrounding rock control in fully mechanized caving mining, basic theory of roof control of efficient fully mechanized caving mining, explore the overlying layer security structure and its reasonable thickness for debris flows prevention in pit; research and development caving mining roof disaster prediction and warning system.

6. Land damage rule and ecology restoration method caused by large working surface mining in sandstorm area

In view of western sandstorm area large working surface coal mining to the land ecological environment strong perturbation question, to study the ground movement and deformation law and the mechanism; reveal crack coming up and development law, the water and soil environment and the plant ecology evolution rule; develop the principles and methods of ecological restoration; explore the comprehensive evaluation and monitoring methods of land damage.

7. Mechanism and technology foundation of alumina extraction by acid method from high-alumina coal ash

Studies on physicochemical properties of high-alumina fly ash, activation methods (physical or chemical) and response mechanism of pulverized coal furnace fly ash; technology scheme of extracting metallurgy grade alumina from coal ash by acid method; key technologies, boundary conditions and process parameters of dissolution, impurity, crystallization, and calcinations etc.

8. Basic technology of treatment and reuse for waste water generated in the extraction alumina by fly ash acid method

In allusion to the characteristics of containing a certain corrosive salts and metal ions in the waste water of fly ash acid method extracting alumina production process, to study (different degrees wastewater) the water quality

change mechanism and the tendency of the different processing craft, and propose the applicability of different process method to satisfy the environmental protection and achieve the cyclic utilization of the waste water.

9. Basic theory of lining design of TBM (Shield) coal mine tunnel (Inclined Shaft) under complex conditions

Research on the reasonable segment joints of lining and lining form (composite and single layer), mechanical properties, deformation characteristics and calculation model for design of long TBM (shield) construction tunnel (inclined), reasonable the joint waterproof forms of the structure as a whole (vertical and horizontal) and long-term security under complex conditions, such as greater depth, high pressure and high stress

10. Basic technology of increasing permeability in low permeability coal seam

Studies on new methods for high power electric pulse fracturing technology for soft, poor permeability coal seam in the role of mechanisms, operating methods and increasing permeability effect evaluation methods; the transformation and migration law of gas bearing after permeability increasing; gas flow field variation laws in gas drainage process.

11. Basic technology of ultra-supercritical circulating fluidized bed boiler

To develop the critical basic technology of ultra-supercritical circulating fluidized bed boiler based on studies of ultra-supercritical circulating fluidized bed boiler system layout, structure, solid flow, heat transfer, combustion and pollution control features, combined with the engineering of large-scale fluidized bed boiler combustion adjustment, operation optimization and preventive treatment measures,

12. Basic technology of 700 °C ultra-supercritical coal-fired power generation

Researches on basic performance and the long-term operational performance of the high temperature heat-resisting material research; large-caliber pipes manufacturing process of high temperature materials research, unit initial parameter selection, systems integration design and compact arrangement to reduce the amount of high temperature piping design research; the supporting boiler, steam turbine key technology research.

13. Basic theory of physical chemical basis and control mechanism of

MTO wastewater reclamation utilization

Studies on wastewater production and reaction mechanism in the MTO process; Combined with coal chemical industry process to study wastewater utilization (physical and chemical) and its control methods, including basic methods of analysis and characterization of water quality, wastewater classification of all stages and multi-leveled water processing, and propose the systemic wastewater treatment technology scheme and reuse evaluation system

14. Basic theory of coking coal blending

Studies on caking differences evaluation and characterization index of the same metamorphic grade vitrinite in the carbonization process; varying degrees vitrinite and inertinite interaction mechanism effect law on the of coking thermal properties (such as reactivity and strength after reaction) in the process of coking; design coking coal blending evaluation indicator system and a prediction model base on metallurgical coke thermal properties.

15. Basic technology of the process of cascade utilization during coal classification transformation

Studies on characteristics and mechanism of coal ratings thermal transition and of directed thermal transition process effected by coal composition characteristics, mineral component, temperature and the run operation parameter; coal pyrolysis combustion ratings transformation system of material match and energy cascade utilization model; coal ratings thermal transition key process of mechanism and control; the mechanism improving tar rate in coal pyrolysis process; gasification and combustion characteristics under the conditions of the pyrolysis of coal char steam / oxygen.

16. Dynamic characteristics and adaptability of railway infrastructure for 30 ton and above axle load

Studies on the characteristics of reaction on bridge structure by 30 ton and above axle loading trains and adaptability of the bridge for such loading conditions; structural dynamics of tunnel base in 30 ton and above axle loading conditions; and study dynamic characteristics of existing rail bed and rail structure adaptability in 10 ton and above axle loading conditions.

Joint Fund of Iron and Steel Research

The Joint Fund of Iron and Steel Research were set up by NSFC and

Baoshan Steel Complex. The Joint Fund aims closely at major issues and strategic development of Chinese iron and steel industry. The Joint Fund supports foresight and innovative research, promotes the integration of knowledge innovation and technological innovation, through scientific and technological innovation, speeds up the research and development of new technologies and products in metallurgy and materials, improves traditional industry and increases the competitiveness of Chinese iron and steel industry. The budget for 2013 is 12.5 million yuan, in which funding for “Fostering Program project” is 450,000 yuan per project for 3 years, and 2 to 2.4 million yuan for “Key Program project” for 4 years.

The Joint Fund is open to scientists all over China, with the key funding areas ranging from new metallurgical technologies and relevant techniques, materials, energy, environment, equipment, to information science and so on, which are of great significance to the nation’s iron and steel industry.

The performance of the application, evaluation and management of the Joint Fund will follow the regulations of NSFC for relevant programs. Proposals are accepted and processed by NSFC’s Department of Engineering and Materials Sciences, and administered jointly by NSFC and Baoshan Steel Complex.

The Joint Fund advocates the synergy of industry, university and research, gives priorities to young talents, encourages applications from non-metallurgical universities and research institutes, and encourages further joint funding from other sources.

I. Research Directions for “Fostering Program Project” in 2013

1. Basis of the key technologies about sintering flue gas denitrification
2. Basis of the key technologies about the suppression for the transverse corner crack of medium carbon steel
3. Basic research for the new technology about the electroslagremelting as well as the mechanism of its effect for the quality of the steel ingot
4. Nano-alloying for the surface of carbon steel
5. Damage mechanism and fatigue behavior of magnesium alloy
6. Fracture mechanism of metals during the rolling process
7. Technology for stainless steel composite plate obtained through vacuum composite rolling

II. Research Areas for Key Program Projects in 2013

1. Mechanism of manufacturing technology for super-thick steel plate(>60mm) with low compression ratio

In allusion to the current compression ratio(2~3) and the slow solidification rate of continuous casting slab, to put forward the main problems about the production of super-thick steel plate; carry out research on the solidification organizational structure between casting billet and thick plate, the distribution rule of the inclusion and precipitate, central porosity and segregation behaviors etc., as well as the genetic relationship between casting billet and thick plate; analyze the mechanism related to the production of super-thick plate with low compression ratio, and put forward the corresponding technical measures and the overall solution.

2. Mechanical and corrosion behavior of pipe end for the “super three” (ultra-deep, ultrahigh temperature, extreme corrosion) tubing and casing of gas well

In allusion to the service environment of oil pipe operating in the “super three” gas well with complicated working conditions, to carry out research on completion pipe static and dynamic mechanical behavior and their impact on seal integrity of well casing; Through the research for mechanics, erosion and corrosion behavior of joint, to establish evaluation methodology of joint erosion and crevice corrosion under the conditions simulating the actual service environment for the pipe of the “super three” gas well; to explore the effect of acidification on the variation rule of sealing performance under the condition of different external pressure, internal pressure, tensile property and bending load and the effect of acidification on the corrosion performance of pipe.

3. Detoxification mechanism and application as resource of dangerous solid waste containing Cr

Research on the varying condition and mechanism of the valence of Cr in the dangerous solid waste containing Cr; Detoxification mechanism of dangerous solid waste containing Cr; curing mechanism of element Cr, Ni etc., adjustment mechanism for component and phase diagram related to the steel slag containing Cr and other solid waste in steel plant; Research the occurrence state and the stability of Cr in glass-ceramic.

4. New process and new technology for Iron and steel industry

Around 3-4 projects are planned for funding under the category of Key Program.

Joint Fund of Civil Aviation Research

The Joint Fund of Civil Aviation Research is set up jointly by NSFC and the Civil Aviation Administration of China (CAAC). The Fund is open to all scientists in China. It is aimed to attract researchers from the universities and research institutions across China to participate in basic research and applied basic research in the development of aviation science and technology, so as to enhance the ability of original innovation in the aviation industry, promote the integration of knowledge and technology innovation in the field, and contribute to making China a nation with strong aviation industry.

Under mutual agreement, NSFC and CAAC decide to implement the third phase of the Joint Fund of Civil Aviation Research from 2011, with an annual budget of 19.5 million yuan.

As a component of the National Natural Science Fund, the Joint Fund is managed by both parties. Researchers in non-aviation sectors are encouraged to carry out joint research with those in aviation sectors.

Research Areas in 2013

In 2013, it is planning to fund 3 Key Program projects, with average funding 2.5 million per project for 4 years, and “Fostering Program project” will be 400,000 yuan per project on average for 3 years, and the number of projects to be funded is decided according to the actual application and evaluation.

Fostering Program Projects

1. New theory and technology, the simulation technology for civil aviation system, intelligent air traffic and information security, the theory and methods of system reliability and system security, and the theory and technology for airport sensing
2. The theory and methods for the management of national aviation resources, the theory on aviation security management and aviation crime prevention and controls, and the contingency decision system for emergency

3. Basic theory and technology for aviation safety, new theory and methods for security check, new materials and new technology of airplane and theory and technology of detection.

Key Program Projects

1. Data processing and key maintenance technology for airborne weather radar
2. Mode and method for coordinated operation of flight arrival and departure in multiple airport terminals
3. Applications of Beidou II in civil aviation guidance
4. Studies on detection of damage failure of carbon fiber resin based composite materials for civil aircraft

Joint Fund of Petrochemical Engineering

The Joint Fund of Petrochemical Engineering is set up joint by NSFC and China National Petroleum Corporation (CNPC). The goals are to implement fundamental, strategic and innovative researches in areas of petroleum and petrochemical engineering which are closely connected with the issues of important technologies and key scientific theory, to promote the coordinated innovation between knowledge and technology, university/institute and enterprise, and to foster the scientific & technical talents, so as to strengthen further the ability of innovation with own property and core competition of Chinese petroleum and petrochemical engineering and industry.

As a part of the National Natural Science Found, the project application, evaluation and management of the Joint Fund will follow the regulation of NSFC. The Joint Fund is managed together by NSFC and CNPC. It has established a Joint Fund management committee that is in charge of whole program and strategic direction of major problems, and an office attached to the committee that consists by the management persons of two parties and is in charge of coordination in the implementing process and daily management. The acceptance and evaluation of projects are implemented by the Department of Chemical Sciences of NSFC.

The Joint Fund is open to scientists all over China, carrying out fair competition, encouraging intercross between disciplines and connectedness between enterprises & universities/institutes, research & application. The projects with excellent studying condition and strength would be

preferentially supported within the area designed in the *Guide to Program*.

The joint fund will support two types of project: Key Program projects and Fostering Program projects. In 2013, it is planning to arrange a total funding of 30 million yuan for 5-6 Key Program projects with 2.4-3.0 million yuan per project for 4 years and 25-30 Fostering Program projects with 0.5-0.6 million yuan per project for 3 years.

Funding Areas in 2013

1. New type catalytic materials in the petrochemical engineering

In connection with the bottleneck issues involved in high efficient catalytic conversion of heavy oil, clean petrochemicals and basic organic chemicals, it is to study the acting mechanism of catalysts, explore new reaction, developing theory for design and preparation of catalytic materials, and prepare new catalytic materials and catalysts for improving performance of catalysts (e. g. activity, selectivity, stability, regenerative ability and so on). It is to focus on the development of new method for catalytic materials and high efficient preparation, so as to break through key technical issues in processing of heavy oil, dehydrogenation of low-carbon alkenes, gasoline components with high-octane value and advance lubricating oil.

2. Polyalkene resin with high additional value

Studies on the design of new type catalysts system, the polymerization technology and structure-performance relation involved in development of polyalkene resin with high additional value, such as polyethylene, polypropylene and so on. Its focal point is to study special materials with high additional value (e.g. pipe-type resin with high intensity and tenacity, dendritical polyalkene & elastomer materials, and polypropylene with high melting index, high melting point, rigidity and high diaphanaity), α -alkene with wide molecular distribution, catalyst system used in polyalkene wax, and relevant chemical engineering foundation of recycle fluidized bed, pipe coil & pot type reactor and gaseous phase fluidized bed reactor as well as functional regulation of polyalkene.

3. Synthetic rubber with advance performance

Basic technical research on synthesis, processing and modified of synthetic rubber with high property, low cost and environment friendly, orientated by key issues of production and processing of synthetic rubber, such as butyl-, polybutyl benzene, ethyl-propyl- and iso-pentenyl rubber. It is aiming to construct the polymeric system with high efficiency, low cost and low

pollution, study the polymeric reaction method, reveal the relation between rubber processing and aggregative structure with multi-level & multi-scale as well as performance used, as well as studies on structure control, chemical modified and processing technology in treating process after rubber is synthesized.

4. Advance performance carbon fiber and its complex materials

In accordance with some basic issues related to scale production, structure fine control of carbon fiber and its complex materials in some areas used, basic applied research will be carried out on scale production of high performance carbon fiber and its complex materials in the advance application. It is aiming at great-scale utility of carbon fiber in the areas of aviation/space, exploitation/storage/transport of oil gas resource, automobile, new energy and so on, so as to break through technical bottleneck of scale production and utility of carbon fiber & its complex materials.

5. Chemical engineering foundation in the petrochemical engineering

Research on selective catalytic conversion, strength of heat/mass transfer process, reaction kinetics and technology, structure evolution & controllable preparation of products, optimum design & scale up of reactor, safety of reactive process, clean production, and high efficient separation & fine processing of products, in connection with common issues of saving energy, reducing exhaust, safety production and products with advance performance. Key scientific or basic engineering issues are: (i) the flowing, mixing, heat transfer and separation of non-newton fluid with high viscosity; (ii) the regulation of molecular & particle structure in the reactive process; (iii) the coupling between transfer and reactive process in reaction system; (iv) stoppage diagnosis and safety pre-warring to reaction system. It is encouraged to study the high efficient conversion of inferior heavy oil.

NSFC-Guangdong Joint Fund

NSFC and the Guangdong Provincial Government jointly implement the second phase of Joint Fund of Natural Science (NSFC-Guangdong Joint Fund for short) from 2011 to 2015, trying to attract outstanding scientists in Guangdong Province and other areas in the country to solve common and major scientific and key technical issues in the future development of economy, society, science and technology in Guangdong and surrounding areas, and promote the scientific and technological development and the fostering of talent teams in the region.

The NSFC-Guangdong Joint Fund is open to scientists all over China, and is part of the National Natural Science Fund. NSFC is responsible for receiving applications. The application, evaluation and management comply with the regulations of NSFC and the detailed procedures of the Joint Fund.

In 2013, the Joint Fund is planning to arrange a total funding of 77.25 million yuan, accepting applications in 5 areas listed below. The Joint Fund mainly supports Key Program projects, with a funding of 2.6 million per project for 4 years, and at the same time, supports some Fostering Program projects with average funding of 600,000 yuan per project for 3 years. Eligible researchers all over the country are welcomed to apply for this Fund according to the scope and requirement in the Guide.

I. Agriculture

1. Exploitation and use of agricultural bio resources

Focusing on key factors of production and quality of important farm crops and economic produces, conduct research on genetic functions and biological mechanism of resistance to heavy metal pollutant and low accumulation and pest resistance, so as to provide theoretical basis for safety, high yield, quality and steady production of crops.

Main research orientations:

- (1) Research on genetic resources and functions related to resistant to and low accumulation of heavy metal pollutant of important agricultural crops
- (2) Research on reproductive biology of important ornamental plants in south China

2. Research on the functional mechanism of key factors affecting healthy breed of livestock

In connection with key factors affecting healthy breed of livestock in south China, research should focus on the interactive mechanism between pathogen and organism, physiologic regulation mechanism of livestock eating and toxicological effect mechanism of environmental hazards, so as to provide theoretical basis for sustained development of livestock industry.

Main research orientations:

- (1) Mechanism of physiologic behaviors of livestock ingestion;
- (2) Toxicology effect and regulation mechanism of important toxic materials

in livestock feeding environment.

3. Research on basic biology of improved variety breeding and metabolic regulation of important aquaculture animals

Focusing on key S&T problems of evaluation of germplasm resources and improved variety breeding for important aquaculture animals in South China, basic biological research should be carried out for providing theoretical and technological basis for healthy and sustainable development of aquaculture.

Main research orientations:

- (1) Basic research on evaluation of germplasm resources and breeding of local special marine economic animals, such as sea slug;
- (2) Molecular basic research on breeding of improved variety of important cultured fish.

4. Food processing and food safety

Focusing on special bio products and aquaculture food in South China, conduct basic research on processing characteristics, mechanism of bio active function and safety control, so as to provide theoretical basis for efficient use of bio resources and food safety.

Main research orientations:

- (1) Analysis of nutritious components in specialty food in south China
- (2) Detection and identification pollutants in hazard microbe in aquaculture food and mechanism of risk generation

5. Special bio resources in south China and its sustainable use

Based on special bio resources (including land and marine bio resources) in south China, study should be focused on characteristics of resources, key conditions of generation and mechanism of sustainable use.

Main research orientations:

- (1) Protection, breeding and sustainable use of biodiversity on land
- (2) Special pharmaceutical resources in South China Sea

II. Population and Health

1. Study on common diseases in South China

For common disease and frequent disease in south China, it is to conduct basic research on pathogenesis and control of disease.

Main research orientations:

- (1) Pathogenesis and control of common bone metabolic disease
- (2) Reconstruction of COPD breathe channel induced by air pollution
- (3) Inflammation mechanism of atherosclerosis
- (4) Physiology and pathogenesis of audio information processing

2. Prevention and control of cancer

Focusing on common cancer in south China, it is to conduct basic research on pathogenesis, re-occurrence and transfer of cancer, so as to provide foundation for early diagnosis and personalized therapy.

Main research orientations:

- (1) Interaction of genetic and environmental factors in occurrence of esophageal cancer
- (2) Molecular mechanism of re-occurrence and transfer of bladder cancer

3. Basic research on major diseases

Starring from major disease, it is to conduct basic research on pathogenesis, emphasizing on frontier problems.

Main research orientations:

- (1) Immunology basis of early intervention of severe virus hepatitis
- (2) Studies on mechanism of damage and repair of bone marrow

4. New drug and therapy target

Focusing on high incidence diseases and major disease in south China, it is to conduct basic research on new drug and new therapy target.

Main research orientations:

- (1) Studies on new target of anti-flu drugs and guiding compound of natural source
- (2) Drug resistance mechanism for target therapy of cancer

III. Resources and Environment

1. Mechanism and control principles of regional air pollution by fine particulates matter (PM2.5)

PM2.5 pollution is one of outstanding problems of air quality in China. It is necessary to carry out thorough studies on the sources and generation of PM2.5, develop and improve mode of forecast, explore principles of controlling important pollution sources, so as to help with decision making for regional control of PM2.5

Main research orientations:

- (1) Analytical method for atmospheric PM_{2.5} source
- (2) Model of prediction and forecast of regional PM_{2.5}
- (3) Atmospheric chemistry of secondary aerosol precursor

2. Principle of controlling typical heavy metal and metalloid pollution in water

In recent years, Pearl River basin suffered several times pollution by heavy metal (Hg, Pb, Cd, Tl, Cr) and metalloid (As, Sb) due to human activities. Taking typical toxic heavy metal and metalloid as subject, it is to carry out researches on key problems of environmental impact, warning and response, emergency management for typical heavy metal and metalloid pollutions in basin water.

Main research orientations:

- (1) Identification, mechanism of evolution and warning of heavy metal and metalloid pollution in basin water
- (2) Theory and technology of emergency management of high density heavy metal and metalloid in water
- (3) Environmental impact and control mechanism of acidic waste water discharge in mining sites

3. Studies on oceanography of South China Sea

Marine resources in South China Sea are important strategic economic resources of China. This project should be focused on the basic research on South China Sea especially deep-ocean, so as to provide theoretical basis and technology for proper use and protection of marine resources in South China Sea.

Main research orientations:

- (1) Monitor and numerical assimilation technology for 3-D environmental process in deep sea region in South China Sea
- (2) Development and oil and gas deposit in deep sea oil and gas basin in South China Sea
- (3) Structure, function and mechanism of maintaining biodiversity of near shore eco system

4. Specialized resources in South China and mining site environment

Main research orientations:

- (1) Background, process and laws of mineralization for specialized mineral

- deposits in South China
- (2) Multi field coupling mechanism of deep geothermal resources
 - (3) Mechanism of generation and control principles for radioactive pollution in mining and neighboring areas

IV. Materials and Manufacturing

1. New materials

According to the need of scientific frontier and development of strategic arising industries, conduct basic research on new types of photo electric functional materials and devices, new energy material and construction materials for seaside building.

Main research orientations:

- (1) Preparation and devices of new types of rare earth photo electric photo functional materials
- (2) Design, preparation and devices of high performance electronic information materials
- (3) Preparation and application of new types of high performance, low cost battery materials and energy storing capacitor materials
- (4) Studies on the mechanism of degrading and self-repairing technology of cement materials for seaside environment

2. Advanced manufacturing

Focusing on demand on the development of manufacturing and equipment industry by cars, machinery, transportation and energy areas, to conduct studies on low carbon manufacturing technology for typical engineering materials and failure mechanism of environmental service and technology related to surface treatment.

Main research orientations:

- (1) Failure mechanism of complex environmental service and technology related to surface treatment for aluminum alloyed component and steel structure component
- (2) Principle and new method of dynamic monitor, diagnosis and maintenance of high end equipment
- (3) New principle and new method of low carbon manufacture on high performance device and component

V. Electronic and Information Technology

1. Theory and key technologies for internet of things and mobile

internet

Addressing key scientific problems in internet of things and mobile internet, focusing on hetero network integration, mass information processing and optimizing service quality, to conduct studies on basic theory and key technology of internet of things and mobile internet, including M2M communication in hetero wireless environment, service and safety of wireless P2P in mobile internet, and application of internet of things and intelligent power grid.

Main research orientations:

- (1) Theory and method of M2M communication in hetero wireless environment
- (2) Theory and method of information cognition and optimization of supply and need of intelligent power grid based on internet of things
- (3) Mobile internet service and privacy and security

2. Theory and key technologies for cloud computing and large data processing

Addressing common problems in social services such as electronic public management, electronic commerce and social network, to conduct studies on cloud computation, basic theory, model and core technology of large data processing.

Main research orientations:

- (1) Model and key technology of cloud service for public service applications
- (2) Management, analysis and mining technology for multisource large data
- (3) Key technology of high performance cloud computing for large data

3. Network monitoring and system security for regional applications

This project will focus on common key scientific problems in network development, addresses the technical need on public security, intelligent transportation, intelligent family and community, and environmental monitoring, to conduct studies on theory and key technologies for mobile network monitoring, large data integrated processing, reliability analysis of internet of things, and 3-D monitoring in broad areas.

Main research orientations:

- (1) Structure, theory and key technology for network monitoring based on coordinated method
- (2) Theory and key technology for network system security based on

feedback mechanism

4. Intelligent image analysis and video image processing

In this research direction, focus will be given to key scientific problems arising in real applications such as image analysis and video image processing. Addressing the shortcomings of lack of method, quality and post processing of medical imaging, the project should combine new theory and method with existing technology to build digital, intelligent and high quality modern medical imaging and analysis system. Focusing on common basic research problems in application of high resolution 3-D video, key studies will be on key technology of 3-D video content generation and coding, so as to construct high performance, practical 3-D video information system thereby speed up the upgrading of information industry in Guangdong Province.

Main research orientations:

- (1) Studies on clinical and basic problems related to inferred thermal imaging technology
- (2) Analysis and separation technology for medical images
- (3) Medical image processing and key technologies of virtual operation
- (4) Generation and coding of high resolution 3-D naked eye video image content

NSFC-Yunnan Joint Fund

NSFC and the Yunnan Provincial Government jointly set up the Joint Fund of Natural Science (NSFC-Yunnan Joint Fund for short) in order to implement the Outline of the National Medium- and Long-Term Program for Scientific and Technological Development (2006-2020), to practice “Science and Technology Plan for the Innovative Yunnan”, to attract more talented professionals, and to carry out basic research on important and key scientific and technical issues of the economy, society, science and technology in Yunnan and surrounding regions, to booster the development of science and technology and the construction of talent resources, to facilitate the indigenous innovation and international competition, and to promote the sustainable development of regional economy and society.

The Joint Fund is open to scientists all over China, and is part of the National Natural Science Fund. NSFC is responsible for receiving applications. The application, evaluation and management will be performed

in accord with the Regulation on the National Natural Science Fund and related administrative measures as well as the detailed procedures of the NSFC-Yunnan Joint Fund.

In 2013, the Joint Fund is planning to arrange a total funding of 46.75 million yuan, mainly for 4 Key Program projects in areas listed below, with an average funding of 2.2 million yuan per project for 4 years. Eligible researchers all over the country are welcomed to apply for this fund according to the research scope and requirements in the Guide.

I. Protection of Biodiversity

Focusing important species in the plateau regions in Yunnan, it is to conduct biodiversity studies on species, genetics and ecosystem.

1. Biodiversity

Main research orientations:

- (1) Mining and utilization of specialized plant germplasm resources
- (2) Diversity and sustainable utilization of important fungi resources
- (3) Important bio eco adaptability and evolution mechanism
- (4) Mining and utilization of digestive enzyme of wild animals

2. Agricultural and forest resources

Main research orientations:

- (5) Mining and utilization of genetic resources of important economic crops and plants
- (6) Mining, save and utilization of high quality breeds of specialized livestock and poultry in plateau regions
- (7) Control of pests and disease of important crops

3. Other areas

Main research orientations:

- (8) Basic research on efficient use of wood and bamboo timber
- (9) Studies on the control of invasion of major hazard alien species in Yunnan
- (10) Studies on mining, continuous cultivation and disease and pest control of important cultivated pharmaceutical plant germplasm
- (11) Studies on the impact of continuous spring draught on agricultural bio diversities

II. Population and Health

1. Basic research on drug discovery aiming at major human diseases by using typical resources in Yunnan

Main research orientations:

- (1) Discovery, synthesis and structural optimization and medical functional mechanism of natural active materials
- (2) Studies on new target and new functional mechanism of controlling and curing major commonly occurred diseases using specialized drugs in Yunnan
- (3) Basic research on the ethnic medicine (Yi, Dai, etc.) and specialized drugs in Yunnan

2. Basic study on the pathogenic mechanism and control of regional high incidence diseases and major diseases in ethnic regions in Yunnan

Main research orientations:

- (4) Basic research on high incidence and regional diseases in Yunnan
- (5) Basic research on vaccines for new epidemic disease
- (6) Basic research on drug addiction and rehabilitation, and treatment of AIDS
- (7) Basic research on trans-regional spreading and control of epidemic disease in sub regions of Lancang River and Mekong River
- (8) Development of modeling and evaluation system of major disease based on specialized animal resources in Yunnan

III. Resources and Environment

1. Basic research on new theory, new method and new technology of effective protection and integrated restoration based on the eco environment in Yunnan Guizhou plateau

Main research orientations:

- (1) Mechanism of controlling and recycling of heavy metal waste water pollutants
- (2) Mechanism and process of degrading of red plateau soil and its impact on environment
- (3) Re-vegetation and recovery of rock and desertification regions
- (4) Mechanism and principles of control technology for water pollution of plateau lakes

2. Basic research on specialized resources and natural disasters in Yunnan

Main research orientations:

- (5) Studies on animal group in Chengjiang and relevant environment
- (6) Response of typical eco system of Yunnan to global change
- (7) Mechanism of geological disasters such as earthquake, landslide and mudslide

3. Basic research on laws of mineral deposit and exploration and utilization in Yunnan and surrounding regions

Main research orientations:

- (8) System and mechanism of mineral deposit in typical mineral deposit regions in Yunnan and surrounding regions
- (9) Basic research on deep mineral information identification
- (10) Impact of mining on environment of surrounding area and mechanism of restoration

IV. Utilization of Mineral Resources and New Materials

Focusing on the theory and technology for the integrated utilization of mineral resources and strategic scientific issues of important materials, it is to conduct basic research.

1. Research on technologies of selection, metallurgy and preparation non-ferrous metal

Main research orientations:

- (1) New technology and new method of metallurgy of nonferrous metals
- (2) Preparation technology of high purity nonferrous metals and compound
- (3) Technology of efficient recycling of secondary resources of nonferrous metals
- (4) Control and restoration of waste pollution in nonferrous metal metallurgy

2. Research on new technology of deep processing of nonferrous metal

Main research orientations:

- (5) Basic research on preparation and application of functional materials of rare and noble metal
- (6) New technology and new method of processing nonferrous metals such as aluminum, titanium and copper

3. High efficiency use of specialized resources

Main research orientations:

- (7) Research on integrated use of low grade complex nonferrous metal resources

(8) Studies on clean and efficient utilization of low grade brown coal resources in Yunnan

4. Other research on photoelectric materials and preparation method

Main research orientations:

- (9) New technology and new method of deep shaft excavation of metal mines
- (10) Research on application of metal oxide semiconductor materials in image transducers
- (11) New types of inferred optical materials and devices

NSFC-Xinjiang Joint Fund

NSFC and the Government of the Xinjiang Uygur Autonomous Region jointly set up the Joint Fund (NSFC-Xinjiang Joint Fund for short) on March 21, 2011 in response to make full use of the guiding role of NSFC and attract a number of outstanding scientists to work in Xinjiang, booster the development of science and technology and the construction of talent teams, increase innovative capability of universities and research institutes in Xinjiang and promote the sustainable development of regional economy and society in Xinjiang.

The Joint Fund is open to scientists all over China. It is part of the National Natural Science Fund, and a platform of proving scientific and technological aid to Xinjiang. NSFC is responsible for receiving applications. The application, evaluation and management will be performed in accord with the Regulation on the National Natural Science Fund and related administrative measures as well as the detailed procedures of the NSFC-Yunnan Joint Fund.

In 2013, the Joint Fund is planning to arrange a total funding of 49.18 million yuan, mainly for Fostering Program Project, Key Program Project and Special Grant for Local Young Talents in 4 areas listed below. For Fostering Program Project, the average funding is 600,000 yuan per project for 3 years, and for Key Program Project, the average funding is 2.8 million yuan per project for 4 years. The Special Grant for Local Young Talents supports researchers with good research achievements in Xinjiang to conduct innovative research within the funding scope outlined in the Guide. It supports up to 2 outstanding local young researchers under 45 with funding of 1 million yuan per project for 4 years. Eligible researchers all

over the country are welcomed to apply for this fund according to requirements in this Guide through home institutions.

I. Water Resources and Agriculture

Taking water resources, oasis ecosystem and agriculture in arid areas of Xinjiang as object of study, it is to conduct studies on formation of water resources and water cycling process, water saving agriculture in oasis and impact of global change. Focusing on sustainable agriculture development, it is to conduct research on genetic basis and mechanism of formation of important economic characteristics of grain (wheat and corn), economic crops (cotton and barley), vegetables (melons and tomatoes), and major livestock, so as to provide important information for molecular design breeding.

Main research orientations:

1. Mechanism of water compensation and discharge of shallow and deep level ground water in arid area
2. Process and mechanism of the impact of water saving agriculture in oasis on basin water cycles
3. Impact of global change on water resources and ecosystem
4. Mechanism of water cycling and sustainable use of water resources in arid areas
5. Bio mechanism of use and consumption of water by crops
6. Mining and innovations on good germplasm resources of crops in Xinjiang
7. Basic research on pathogenic mechanism and control of important animal epidemic diseases in Xinjiang
8. Mechanism of formation and regulation of important trait of major livestock in Xinjiang

II. Mineral Resources

1. Basic research on geology of mineral deposit

To meet the needs of mineral resources of China, focusing on rich mineral resources in Xinjiang and neighboring areas, it is to conduct research on geology of mineral deposit and identification and extract method of remote sensing information of mineral deposit..

Main research orientations:

- (1) Function and laws of salt mineral deposit in Xinjiang
- (2) Comparison studies on mechanism of typical mineral deposit formation

- in Xinjiang and neighboring areas
- (3) Quantitative studies on spectrum characteristics and remote sensing of minerals in desert areas
 - (4) Intra continental organic function in Cenozoic and laws of situ leaching sandstone uranium deposit

2. Integrated use of mineral resources

Taking advantages of mineral resources and the needs of industrial development in Xinjiang, it is to conduct basic research on integrated use of mineral resources and farsighted major scientific problems of materials.

Main research orientations:

- (1) Basic research related to nonferrous metal functional materials based on specialized minerals in Xinjiang
- (2) Research on microstructure and property of metal based materials such as copper and nickel.
- (3) Studies on preparation, improvement of active carbon based on coals in Xinjiang and preparation of carbon based composite materials

III. Biodiversity and Bio-resources

Focusing on important specialized bio resources in arid and semiarid desert oasis in Xinjiang, it is to conduct studies on biodiversity and development and utilization of resources.

Main research orientations:

1. Mechanism of physiology and ecology adaptability and protective biology of wild bio resources in Xinjiang
2. Studies on specialized pharmaceutical plant resources in arid regions
3. Studies on distribution and pathogenic mechanism of parasite groups shared by human and animals in Xinjiang

IV. Population and Health

Research on pathogenic and control of high incidence diseases in Xinjiang; Basic research on discovery of drugs in us of specialized pharmaceutical plant resources in Xinjiang,

Main research orientations:

1. Basic research on control of cardiovascular disease for different ethnic peoples in Xinjiang
2. Basic research on pathogenic and control of epidemic disease

- (hydatidosis and hepatitis) and high incidence cancer (Cervical Cancer and Esophageal Cancer)
3. Basic theory of Uighur medicine and applied basic clinical research
 4. Material basis and functional mechanism of medical effect of specialized drugs in Xinjiang

NSFC-Henan Joint Fund

The Joint Fund of Talent Fostering (NSFC-Henan Joint Fund for short) is jointly established by NSFC and the Henan Provincial Government to make full use of the guiding role of NSFC, increase the innovative capability of universities and research institutes in Henan Province, promote the sustainable development of regional economy and society, and foster young talent teams for Henan Province. With the incorporation of the national strategy for central China economic region, the Joint Fund supports researchers conduct basic research to meet the needs of talent team development and regional economic and societal development.

As part of the National Natural Science Fund, NSFC is responsible for receiving applications. The application, evaluation and management will be performed in accord with the Regulation on the National Natural Science Fund and related administrative measures.

In 2013, the Joint Fund is planning to arrange a total funding of 44.1 million yuan. The average funding is 300,000 yuan per project for 3 years.

I. Eligibility

1. Applicants should meet the following requirement

- (1) Experience of conducting basic research;
- (2) Senior academic title or Ph. D., or recommendations from 2 researchers in the same research area and with senior academic title;
- (3) Less than 40 years old on January 1 in the year of application (born after January 1, 1973);
- (4) Home institution is in Henan Province.

2. The following people may not apply

- (1) Having no work or the employer is not a registered home institution;
- (2) PI of on-going or having undertaken 3 or more NSFC's project;
- (3) Graduate students, but those taking graduate courses part time may apply through home institution with consent of supervisor.

(4) Having ready been funded by this joint fund.

II. Evaluation

Evaluation procedure is the same as the procedure for the Young Scientist Fund.

Joint Fund for Promoting S&T Cooperation Across the Taiwan Straits

The Joint Fund for Promoting S&T Cooperation Across the Taiwan Straits is jointly established by NSFC and Fujian Provincial Government. This joint fund aims at making effective use of the guiding role of NSFC to guide social S&T resources into basic research and further attract and gather scientists on both sides of the Strait to conduct S&T cooperation, solving major scientific problems and key technical problems of mutually concerned by Fujian and Taiwan regions, promote talent fostering, improve S&T innovation capability of economic regions on both sides of the Strait, and promote sustainable development of regional economy and society.

The Joint Fund is open to scientists all over China on fair and competitive basis, and is part of the National Natural Science Fund. NSFC is responsible for receiving applications. The application, evaluation and management will be performed in accord with the Regulation on the National Natural Science Fund and related administrative measures.

In 2013, the Joint Fund is planning to arrange a total funding of 48.75 million yuan, mainly for applications for Key Program in 3 areas listed below, with the average funding of 2.6 million yuan per project for 4 years. Eligible researchers all over the country are welcomed to apply for this fund according to the research scope and requirements in this Guide.

Agriculture

Based on the mining and cloning of functional genetics of important good germplasm resources of crops in Fujian and Taiwan, mechanism of formation of toxic matters in agricultural products, functional genetics of specialized waterfowls in Fujian and Taiwan and major pathogens and pathogenic issues, it is to conduct basic and applied basic research for providing important method and means for innovation in germplasm and save production of agricultural products.

Main research orientations:

1. Studies on innovation and mechanism of eco culturing of good germplasm of important agricultural crops in Fujian and Taiwan
2. Studies on mechanism of formation and immunology detection of toxic matter in major agricultural products in Fujian and Taiwan
3. Outstanding functional genes related to specialized waterfowls in Fujian and Taiwan

II. Resources and Environment

Focusing on land and marine eco environment, it is to conduct basic research on environmental restoration and marine environmental change and marine geology, so as to provide technical support to sustainable development on both sides of the Strait.

1. Studies on environmental restoration, eco protection and recycling of wastes in large mining sites in Fujian
2. Basic research on geology of oil and gas deposit in Taiwan Strait and surrounding regions
3. Studies on marine environment in Taiwan Strait and surrounding regions
 - (1) Studies on marine environmental change and ecosystem response in Taiwan Strait and surrounding regions
 - (2) Studies on beach stability and beach maintenance in Jiawan
 - (3) Studies on the cycling process of marine nitrogen

III. New materials and Manufacture

Focusing on major scientific problems such as photo catalysis, rare earth, new battery, high performance cement and advanced manufacturing areas, it is to conduct basic research on design, preparation and application of key materials.

1. Research on functional materials

Main research direction:

- (1) Basic research on design, regulation and application of new types of photo catalysis materials based on hydrogen generated by solar energy water decomposition and transformation of carbon dioxide
- (2) Basic research on new types of rare earth fluorescent materials based on ionized rare earth minerals
- (3) Studies on mechanism of preparation and control of nano crystal tungsten and zirconium carbide composite materials

- (4) Basic research on preparation and engineering applications of super high strength cement

2. Advanced manufacturing

Main research orientations:

- (1) Theoretical studies on mechanism of dynamic error coupling of multi body systems for high end digital controlled lathe
- (2) Basic research related to technology of precision/super precision grinding processing of new types of photo electric materials