University, has recently passed the appraisal organized by the Ministry of Education. According to the appraisal experts, the system integrating some of the most important bio-characters for identification, such as face, handwriting, signature and iris, etc., is technically of the world leading level and has very important value in both theory and application.

With the support of NSFC, the Unit of Intelligent Image and Word Processing, Electronic Engineering Department of the University has endeavored to the research in bio-character recognition for a long time, and achieved some world-leading results. In 2004, with the ranking No.1 in all of the three parts of evaluation, the THFaceID developed by the University won the Accomplishment Award of Best Comprehensive Performance in a high-level international face-identify evaluation organized by the International Module Recognition Congress. Furthermore, it was ranked among the best in the face-identify evaluation organized in 2004 within the "National 863 High-Tech Program".

Generally, it is very hard for the recognition precision of single bio-characteristic to fulfill the demand of identification. Therefore, the integration of multi-module bio-character identification has become the goal of researchers. The system and frame of multi-module bio-character integration developed by the Department, including friendly and convenient face identification, recognition of legal handwriting and signature, iris identification which has the highest differentiate ability, and identification integrated by various bio-characters, have greatly improved the accuracy of identification and paved the way for practical use.

It is reported that the bio-character identification technique developed by Tsinghua University has been successfully put in use in Luohu Pass, Shenzhen, Guangdong Province. Prof. Ding Xiaoqing, the main program investigator of the project, said that the intrinsic characters of human body such as iris, fingerprint and DNA, will substitute for the present cipher key gradually in the future to protect the safety of personal information and prevent all sorts of criminal and economic offenses.

Slow Positron Beam Research Platform

A NSFC supported project – "Slow positron beam (SPB) research platform and its applications" achieved the 1st class Science and Technology Award of Beijing Municipality.

As one of nuclear analysis methods, slow positron beam technology is extremely sensitive to vacancy type defects in materials. It has been successfully utilized in film-based material science, such as semiconductor film, irradiation damage, surface and interface investigations. Nowadays, this technique became a very important method in characterizing the defect structure and electronic structure in the field of microelectronics technology and material sciences.

Co-sponsored by NSFC and Chinese Academy of Sciences (CAS), Institute of High Energy Physics (IHEP) of CAS designed and established the advanced SPB research platform. The slow positron beam system has high intensity, good mono-energetic quality and stable running capability. This platform will further promote the investigations in material sciences, basic physics research and related technologies.

Construction for slow positron beam platform was involved in several key nuclear and accelerator-based technologies such as nuclear detection, nuclear spectroscopy, positron beam control, positron storage and positron beam chopping/bunching etc. It is a typical high-tech integration work. This project successfully fulfilled their objectives and obtained quite a few innovative achievements. The newly-designed positron moderator with a moderation efficiency of $2x10^{-4}$. And it is easy to prepare without in situ high temperature annealing. This design holds a national innovation patent. The use of self-designed slow positron energy filter mounted outside on vacuum tubes with cosine magnetic coils, avoids high voltage induced safety and operational problems, and distortion of positron beam. They also designed a penning-trap system for positron storage and for transferring pulsed positron beam to continuous beam. With this system, the energy spread of positrons reduced about one order, which is beneficial to the development of slow positron lifetime measurement. They further developed a new positron beam monitoring system, and designed measurement methods coherent with Doppler broadening and three annihilation Gamma energy spectroscopy. Their achievements hold advantaged position globally.

The construction of SPB platform will promote the investigations of positron annihilation spectroscopy in China, and has its significance shown both in physics and application perspectives. Especially when it is shared in a big scientific project, it will definitely provide a unique analysis method. This facility is China's first running slow positron beam system open to various Chinese research institutes and universities. In these years, the system was involved in approximately 20 research projects within which several excellent achievements were made. Furthermore, the system donated valuable running time to several national defense projects. The accomplishment of this platform promoted China's competitively in this field, and improved the usage efficiency of Beijing Electron Positron Collider (BEPC).

Photoinduced Electron Transfer, Energy Transfer and Chemical Reactions in Supramolecular Systems

Achieved by: Chenho Tung, Lizhu Wu, Liping Zhang, and Bin Chen
Technical Institute of Physics and Chemistry, CAS
Support categories:
1. Key Program Project (No. 20332040 and No. 20333080)
2. National Science Fund for Distinguished Young Scholars (No. 20125207)

The research team led by Prof. Chenho Tung (CAS member) trekked in the research of photoinduced electron transfer, energy transfer and chemical reactions of supramolecular system for 20 years. They honored the 2nd class National Natural Science Award in 2005 and obtained a series of research achievements. This project was devoted to the interdisciplinary area of organic chemistry and physical chemistry, and involves three parts:

1) Microreactor-controlled selectivity in photochemical reactions. The development of efficient and highly selective methods for organic synthesis is one of the main topics in organic chemistry, and much effort has been directed toward this goal. Of various approaches the use of organized and constrained media has shown considerable promise. The scientists of this project have successfully controlled the product selectivity of a variety of photochemical reactions by using molecular aggregates and the cavities and surfaces of microporous solids as microreactors. For example, they synthesized a series of large-ring compounds in high yields under high substrate concentrations in microreactors (*Acc. Chem. Res.* 2003, *36*, 39; *J. Am. Chem. Soc.* 1998, *120*, 11594; *J. Org. Chem.* 1996, *61*, 9417; 1999, *64*, 5156; *Org. Lett.* 2001, *4*, 1175). In the photosensitized oxidation of alkenes, they could direct the oxidation selectively toward either the singlet oxygen mediated or the superoxide radical anion mediated products by controlling the status and location of the substrate and sensitizer molecules in the reaction media (*Pure. Appl. Chem.* 2000, *72*, 2289; *J. Am. Chem. Soc.* 1998, *120*, 5179; 1998, *120*, 11874; 2000, *122*, 2446; *Chem. Comm.* 2000, 1085; *Chem. Comm.* 2001, 2280). They also could control the regioselectivity in the cycloaddition of 9-substituted anthracenes, and the photocyclization of azobenzene and stilbazole by using microreactors (*J. Org. Chem.* 1998, *63*, 5857; *Org. Lett.* 2003, *5*, 1075; *Tetrahedron. Lett.* 2002, *43*, 1281.)

2) Photoinduced intramolecular long-distance electron transfer and energy transfer. Photoinduced electron transfer and energy transfer play an important role in chemical and biochemical processes. Electron transfer and triplet energy transfer in general require proximity of the donor and acceptor comparable to their van der Waals radii. However, the evidences for long-distance electron transfer and triplet energy transfer have been accumulated. In this project the scientists have provided a series of evidences for photoinduced intramolecular long-distance electron transfer and energy transfer via a "through-bond" or a "through-space" mechanism. They utilized androstene skeleton or crown ether moiety as bridges, mounted an antenna chromophore (benzidine, benzophenone, carbazole, dibenzolmethanatoboron difluoride etc.) and a norbornadiene (or quadricyclane) group on the bridge framework, and investigated photoinduced intramolecular triplet energy transfer and electron transfer within these systems. They demonstrated that electron transfer and triplet energy transfer processes occur with reasonably large rate constants via a "through-bond" or a "through-space" mechanism depending very much on the nature of the bridge, although the donor and acceptor are separated as far as by ca. 20 Å (*J. Am. Chem. Soc.* 1997, *119*, 5348; *J. Phys. Chem.* 1996, *100*, 4480; *J. Phys. Chem.* A. 2003, *107*, 3438; *Chem. Eur. J.* 2003, *9*, 2763). They assembled a series of donor-sensitizer-accepter systems and obtained long-lived photoinduced charge-separation (*J. Phys. Chem. B.* 2000, *104*, 9468). They also utilized the metal-to-ligand charge transfer excited state of platium (II) terpyridyl complexes as the photocatalyst successfully to produce hydrogen in homogeneous solution (*J. Am. Chem. Soc.* 2004, *126*, 3440).

3) Hydrophobic and lipophobic effects on photochemical and photophysical processes. Hydrophobic and lipophobic interactions are important intermolecular interactions. The scientists of this project have provided a series of evidences for aggregate formation and self-coiling of molecules with non-polar chains in mixed