Monsoon behavior balanced by glaciers

With the support from the National Natural Science Foundation of China, Prof. An Zhisheng and his colleagues at the State Key Laboratory of Loess and Quaternary Geology, Institute of Earth Environment in Xi’an, China have analyzed ancient sediments from a lakebed in southwestern China in order to build a 2.6 million year-long record of ISM variability. An article in August 5, 2011 issue of *Science* reported their research findings.

According to the report, the Indian Summer Monsoon, or ISM, is an annual climate cycle that influences the seasonal rainfall in South Asia and has major implications for human well-being. Though its modern behavior is well-documented, researchers have wondered how the ISM has varied over long, glacial-interglacial time scales.

Whereas previously, researchers speculated that the ISM has only strengthened during warm periods, when the ice sheets in the Earth’s southern hemisphere melted, it is now clear that the ISM has always depended on the size of the ice sheets in both hemispheres at the same time. The researchers’ findings show that the ISM reached its weakest point, and even began to strengthen again, before global volumes of glacial ice had reached a maximum. These results highlight the important role of both hemispheres in governing the relationship between the ISM and glacial cycles, they say. A Perspective by Liu Zhengyu explains the study in more detail.

The title of the paper published in Science was "Glacial-Interglacial Indian Summer Monsoon Dynamics," and coauthored by An. Zhisheng; X. Qiang; Z. Jin; Y. Sun; H. Xu; Y. Cai; W. Zhou; X. Liu; W. Liu; Z. Shi; L. Yan; H. Chang; F. Wu; L. Ai; F. Lu at; A. Zhisheng; X. Qiang; Z. Jin; Y. Sun; H. Xu; Y. Cai; W. Zhou; X. Liu; W. Liu; Z. Shi; L. Yan; H. Chang; F. Wu; L. Ai; F. Lu at Chinese Academy of Sciences in Xi’an, China; A. Zhisheng; W. Zhou at Xi’an Jiaotong University in Xi’an, China; S.C. Clemens; W.L. Prell at Brown University in Providence, RI; J. Shen; S. Wang; X. Xiao at Chinese Academy of Sciences in Nanjing, China; J. Luo at Japan Agency for Marine-Earth Science and Technology in Kanagawa, Japan.
Research Discovers Frequent Mutations of Chromatin

With the support of National Natural Science Foundation of China, BGI, the largest genomics organization in the world, and Peking University Shenzhen Hospital, published online in *Nature Genetics* that the study on frequent mutations of chromatin remodeling genes in transitional cell carcinoma (TCC) of the bladder on August 8th, 2011. Their study provides a valuable genetic basis for future studies on TCC, suggesting that aberration of chromatin regulation might be one of the features of bladder cancer.

According to the article in *Nature Genetics*, bladder cancer is the ninth most common type of cancer worldwide, which affects three times as many men as women. Almost all bladder cancers originate in the urothelium, so they are also known as one of the most common tumors of the genitourinary tract. Each year, about 360,000 new cases of bladder cancer are expected, and about 150,000 people will die of this disease in the world. In North America, South America, Europe, and Asia, TCC is the most common type of bladder cancer diagnosed, accounting for 90% of all bladder malignancies in those regions.

"Considering the high risks of TCC and the lack of comprehensive analysis, we and our partners initiated this project to identify other previously unidentified genes associated with the bladder cancer." said Professor Cai Zhiming, President of Shenzhen Second People's Hospital and the former President of Peking University Shenzhen Hospital. "I hope our unexpected discoveries in this study can provide more important insights into potential diagnoses and the therapeutic applications." he added.

In this study, the exomes of nine patients with TCC were sequenced with BGI's exome sequencing platform. Then, all the somatically mutated genes were screened in a prevalence set of 88 additional patients with TCC at different tumor stages and grades. "After the detections and statistical analysis, we discovered 49 new significantly mutated genes associated with TCC, and these genes are previously unknown to be mutated in TCC." said Professor Gui Yaoting, the co-leading author of the study and Vice-Director of the Institute of Urology at Peking University Shenzhen Hospital. "Another interesting finding is that eight genes among them are associated with chromatin remodeling, which could be related with frequent mutations in the majority of TCCs."

"We identified the genetic aberrations of the chromatin remodeling genes in 59% of the 97 individuals with TCC, and discovered one gene, UTX, could be altered substantially more frequently in tumors with low stages and grades." said Guo Guangwu, one of the co-leading authors of the study and PI of this project at BGI. "This study indicates UTX may pose a potential role in the classification and diagnosis of bladder cancer."

As we all know, aberrations of the chromatin remodeling genes may directly lead to the misregulation of multiple downstream effector genes, consequently promoting the tumor genesis process. "In our study, the newly discovered genetic mutations in the chromatin remodeling genes, except for UTX, are previous unknown in the primary tumors of TCC." said professor Cai. "Our results demonstrate that the disruption of the chromatin remodeling machinery may be one of the main mechanisms that lead to TCC."

Professor Wang Jun, Executive Director of BGI, said, "This study provides further understanding of bladder cancer and other human cancers through the comprehensive analysis of genetic alterations in TCC. It also implicates the necessity to enhance the epigenomics research in the field of cancer studies in the future."
Significant Progress in Water Photochemistry Research

The experimental group led by Dr. Yang Xueming, supported by the National Science Foundation of China, conducted its investigation on the photochemistry of water in the gas phase at the full quantum state resolved level, by using of the high resolution H-atom Rydberg tagging technique, in combination with a tunable vacuum ultraviolet (VUV) light source indigenously developed in Dr. Yang’s laboratory. In collaborations with Prof. Richard Dixon, a fellow of Royal Society in UK, at the University of Bristol, they have made significant progress in the study of water photochemistry in the entire VUV region. Recently, Yang Xueming, Yuan Kaijun and Richard Dixon were invited to write a comprehensive review on the topic of water photochemistry for the *Accounts of Chemical Research*. The review paper has been just published by the *Accounts of Chemical Research* as a cover article (Acc. Chem. Res. 44, 369(2011)).

Water molecule is one of the most important molecules in the Universe. Photochemistry of the water molecule plays a crucial role in atmospheric chemistry, combustion process and interstellar chemistry. It is a benchmark system for experimental and theoretical studies of unimolecular reactions.

In the last ten years or so, the group led by Yang Xueming and collaborators have made considerable advances in the study of the photochemistry of water and its isotopologues. They have published 19 papers all together, including a paper in *Science*. These studies have helped us greatly in our understanding of the characteristics of the excited states, and dissociation mechanisms of water. The results of these works also provide an important knowledge for modeling the role of water molecule in the atmospheric chemistry, as well as in the combustion chemistry and the interstellar chemistry.
Supported by the Key Project and the Fund for Creative Research Groups of the National Natural Science Foundation of China, Prof. Wang Weihua and his group from Institute of Physics, CAS, together with their cooperative partner Prof. LI Maozhi from Renmin University of China, adopted molecular dynamics simulations to carry out their research on structural and dynamical features for the glass forming ability (GFA) in a model Cu_xZr_{100-x} metallic glass-forming systems. It is revealed that not only the <0,0,12,0> icosahedral clusters but also some Zr-centered clusters such as <0,2,8,6>, <0,1,10,4> and <0,1,10,5> play a key role in slowing down the dynamics in CuZr system. While Zr-centered clusters fundamentally determine the stability and slow dynamics, they are further enhanced by <0,0,12,0>. Due to the strong spatial correlation between <0,0,12,0> and these Zr-centered clusters, their relative population influences the dense packing and dynamics in metallic glasses, and further the GFA. The research, which was published in Appl. Phys. Lett. 96, 021901(2010) and highlighted by Nature Asian Materials website (http://www.natureasia.com/asia-materials/highlight.php?id=648), could provide deep understanding on some important issues of glass formation mechanism.

Fig.1. A cluster in CuZr binary metallic glass. It is a distorted icosahedra and has close relation with the glass forming ability of alloys.

More recently, they have studied, with molecular dynamics simulations, the structural features of a model CuZr metallic glass during deformation. Spatially heterogeneous irreversible rearrangement is observed in terms of non-affine displacement. It is revealed that the regions with smaller non-affine displacement have more Voronoi pentagons, while in those with larger non-affine displacement other types of faces are more populated. They used the degree of local five-fold symmetry as the structural indicator to predict the plastic deformation of the local structures and found that the plastic events prefer to be initiated in the regions with less degree of local five-fold symmetry and propagate toward the region with more degree of local five-fold symmetry. The research, which was published in Phys. Rev. Lett. 106, 135503(2011), is of important significance to understand the long standing issues of plastic mechanism of amorphous materials.
Fig. 2. The atomistic configurations of the non-affine displacement D2 illustrated by colors at the strain of 5% with time interval of ≈10 ps (a) and 40 ps (b).

Fig. 3. The correlation between the structures having more degree of local five-fold symmetry and the irreversible rearrangement during deformation at the strain of (a) 5% and (b) 10%.
The neural basis of Drosophila larval light/darkness preference

In a project funded by NSFC, a team led by Associate Professor Gong Zhefeng and Professor Liu Li from the Institute of Biophysics, Chinese Academy of Sciences, discovered that two pairs of central brain neurons control the switch of the preference between light and darkness, by applying the GAL4/UAS system to block function of certain neural cells and investigating the consequent changes in Drosophila larval light avoidance behavior. A short report article published on Science on Oct. 22, 2010 reported this discovery.

According to the report, animal behaviors are generally quite flexible. Animals can adjust their behavior according to the changes in natural environment, nutritional condition as well as factors like age. But, how are animals’ innate behaviors affected by external and internal factors? The underlying neural circuit is still not fully understood. In the case of human being, the behavioral habits and preferences change as the external environmental factors or internal factors like age change. In the case of invertebrates like Drosophila, behavioral preferences also change to meet the physiological needs as environmental condition changes. Young Drosophila larva prefers to stay in darkness whereas the older leaves for sites with more light ---- the larvae no longer need food but they need a cleaner place for pupation.

Associate Professor Gong and his group first screened more than 700 Gal4 lines to obtain preliminary neural map, the paper says. Then by comparing Gal4 expression patterns, they ascertained that two pairs of isomorphic neurons (NP394 neurons) participate in the regulation of larval phototaxis. The higher activity of NP394 neurons corresponds to stronger light avoidance whereas less to stronger preference for light. Furthermore, they found that these two pairs of neurons are in connection with known larval visual pathway. NP394 neurons are close to the axonal terminal of pdf neurons, which have been well established to receive visual input from light sensory neurons. Thereafter, they proved that there exists synaptic connection between the dendritic terminus of NP394 neurons and the axonal terminus of pdf neurons. These result showed that NP394 neurons are downstream of pdf neurons. Further experiments with functional calcium imaging confirmed not only that NP394 neurons are responsive to light stimulation, but also that pdf neurons play an inhibitory role in NP394 neuron’s response to light. This study not only extends the Drosophila neural pathway for visual information processing, but also deepens our understanding on how animal brain interprets visual cues. It is one more step towards the complete resolution of the neural basis of how environmental factors and internal factors affect animal innate behavior.
Important roles of brain-specific carnitine palmitoyltransferase and ceramide metabolism in leptin hypothalamic control of feeding

In a recent issue of PNAS, Professor Wu Donghai of Guangzhou Institutes of Biomedicine and Health (GIBH) and his colleagues published a paper titled “Important roles of brain-specific carnitine palmitoyltransferase and ceramide metabolism in leptin hypothalamic control of feeding”. Prof. Wu has received sustained support from NSFC since 2006.

This article was co-authored by an international group of 9 researchers reflecting achievement of international cooperation.

According to the article, brain-specific carnitine palmitoyltransferase-1 (CPT-1c) is implicated in CNS control of food intake. Prof. Wu and his group explored the role of hypothalamic CPT-1c in leptin's anorexigenic actions. They first showed that adenoviral overexpression of CPT-1c in hypothalamic arcuate nucleus of rats increases food intake and concomitantly up-regulates orexigenic neuropeptide Y (NPY) and Bsx (a transcription factor of NPY). Then, they demonstrated that this overexpression antagonizes the anorectic actions induced by central leptin or compound cerulenin (an inhibitor of fatty acid synthase). The overexpression of CPT-1c also blocks leptin-induced down-regulations of NPY and Bsx. Furthermore, the anorectic actions of central leptin or cerulenin are impaired in mice with brain CPT-1c deleted. Both anorectic effects require elevated levels of hypothalamic arcuate nucleus (Arc) malonyl-CoA, a fatty acid-metabolism intermediate that has emerged as a mediator in hypothalamic control of food intake. Thus, these data suggest that CPT-1c is implicated in malonyl-CoA action in leptin's hypothalamic anorectic signaling pathways. Moreover, ceramide metabolism appears to play a role in leptin's central control of feeding. Leptin treatment decreases Arc ceramide levels, with the decrease being important in leptin-induced anorectic actions and down-regulations of NPY and Bsx. Of interest, their data indicate that leptin impacts ceramide metabolism through malonyl-CoA and CPT-1c, and ceramide de novo biosynthesis acts downstream of both malonyl-CoA and CPT-1c in mediating their effects on feeding and expressions of NPY and Bsx.

Their research findings provided insights into the important roles of malonyl-CoA, CPT-1c, and ceramide metabolism in leptin's hypothalamic signaling pathways, they say.
Integrin activation and internalization on soft ECM as a mechanism of induction of stem cell differentiation by ECM elasticity

In the June 7th issue of PNAS, Professor Feng Xiqiao of Department of Engineering Mechanics of Tsinghua University and his colleagues published a paper titled “Integrin activation and internalization on soft ECM as a mechanism of induction of stem cell differentiation by ECM elasticity”. Prof. Feng has received sustained support from NSFC since 1993.

This article was co-authored by a group of 10 researchers.

According to the article, the mechanism by which ECM elasticity induces lineage specification of stem cells has not been clearly understood. Integrins are well-documented mechanosensors that are positioned at the beginning of the sensing pathway. By using an antibody specifically recognizing the active conformation of \( \beta_1 \) integrin, they observed that \( \beta_1 \) integrin activation in bone marrow mesenchymal stem cells (BMMSCs) was induced by soft substrate to a significantly greater degree than by stiff substrate. In contrast, however, the level of cell surface integrin on soft substrate was significantly lower than that on stiff substrate. Soft substrate markedly enhanced the internalization of integrin, and this internalization was mediated mainly through caveolae/raft-dependent endocytosis. The inhibition of integrin internalization blocked the neural lineage specification of BMMSCs on soft substrate. Furthermore, soft substrate also repressed the bone morphogenetic protein (BMP)/Smad pathway at least partially through integrin-regulated BMP receptor endocytosis. A theoretical analysis based on atomic force microscopy (AFM) data indicated that integrin–ligand complexes are more easily ruptured on soft substrate; this outcome may contribute to the enhancement of integrin internalization on soft substrate.

Taken together, their findings suggest that ECM elasticity affects integrin activity and trafficking to modulate integrin BMP receptor internalization, thus contributing to stem cell lineage specification.
Determination of electron pairing symmetry of iron-based superconductor FeSe

The research team led by Prof. Qi-Kun Xue at Department of Physics, Tsinghua University, and Prof. Xucun Ma at Institute of Physics, Chinese Academy of Sciences, has made a major breakthrough in study of the electron pairing symmetry of FeSe superconductor. The related results have recently been published in the journals of *Science* and *Physical Review B* (Science 332, 1410 (2011), Phys. Rev. B 84, 020503 (R) (2011)).

Iron-based superconductors are presently one of the hottest topics in condensed matter physics and open up a new avenue in the study of unconventional high-temperature superconductors. Similar to cuprates, one of the central issues in iron-based superconductors is the electron pairing symmetry, which is crucial for understanding the mechanism of high-Tc superconductivity. Despite the intense investigation in the last four years, the pairing symmetry in the newly discovered iron-based superconductors remains elusive, partially due to the inhomogeneous samples. To address this issue explicitly, superconducting single crystals or films with extremely high quality are essential.

Among iron-based superconductors, PbO-type β-FeSe has the simplest chemical composition and can be an archetype system for unraveling the mechanism of superconductivity. The FeSe single crystals and films reported so far, however, are known to suffer from great fluctuation in stoichiometry, disorder and clustering pathologies. Moreover, for heteroepitaxial FeSe films the lattice-mismatch between the films and substrates introduces compressive or tensile strain into the films, which becomes more dramatic in ultra-thin films. The situations make the understanding of their superconductivity more challenging.

This research team successfully prepared stoichiometric and superconductive FeSe single crystalline films with extremely high quality by using state-of-the-art molecular beam epitaxy (MBE) technique (Figs. 1A and 1B). Layer-by-layer growth of high quality films has been achieved in well-controlled manner under Se-rich condition, which allows to investigate the thickness dependent superconductivity of FeSe. *In situ* low temperature scanning tunneling spectra reveal that the local superconducting gap in the quasiparticle density of states remains robust down to two triple layers for the minimum measurement temperature of 2.2 K. With such samples, the superconducting gap measured by scanning tunneling spectroscopy at ultralow temperature (0.4 K) shows a V-shaped feature near the Fermi level (Fig. 1C), which clearly demonstrates the existence of line nodes. More importantly, by introducing magnetic field, they could also be able to investigate the quantized vortices, bond states in vortex center and the evolution of bond states (Fig. 2). Both vortex structure and evolution of bond states show two-fold symmetry, providing a direct proof for the two-fold symmetry in electron pairing function of FeSe. This is very amazing because the crystal lattice of FeSe has four-fold symmetry and all properties of FeSe are expected to have the same symmetry. The symmetry breaking means that a new type of ordering of electrons must have been formed in FeSe. In collaboration with the theoretical group led by Prof. Cong-Jun Wu at University of California San Diego, they proposed that the four-fold symmetry breaking may originate from the orbital-dependent reconstruction of electronic structure in FeSe.

These findings will be of great help in preparing other iron-based superconductor films with high quality and in understanding the superconducting mechanism of FeSe and other iron-based superconductors.

The work was financially supported by National Natural Science Foundation of China, Ministry of Science and Technology of China, and Chinese Academy of Sciences.
Fig. 1 STM characterization of the as-grown FeSe films. (A) Topographic image (200 × 200 nm$^2$) of a FeSe film. (B) Atomic resolution STM topography (5 × 5 nm$^2$) of FeSe film. (C) Temperature dependence of differential conductance spectra.

Fig. 2 The vortex core states. (A) STS on the center of a vortex core. (B) Zero bias conductance map (40 × 40 nm$^2$) for a single vortex at 0.4 K and 1 Tesla magnetic field. (C and D) Tunneling conductance curves measured at equally-spaced (2 nm) distance along a- and b-axes.
# List of Projects Jointly Funded by NSFC and CNRS in 2011

National Natural Science Foundation of China (NSFC) and National Center for Scientific Research of France (CNRS) jointly support exchange programs in 2011. After evaluation and consultation, 10 projects are approved:

<table>
<thead>
<tr>
<th>No.</th>
<th>Project Name</th>
<th>Chinese PI</th>
<th>Chinese Affiliation</th>
<th>French PI</th>
<th>French Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Explicit solutions of extended soliton equations and their applications in fluid dynamics</td>
<td>Runliang LIN</td>
<td>Tsinghua University</td>
<td>Robert Conte</td>
<td>UMR 8536, Centre de mathematiques et de leurs applications, Ecole normale superieure de Cachan</td>
</tr>
<tr>
<td>2</td>
<td>Catalytic conversion of cellulose over solid catalyst-supported ionic liquids</td>
<td>Yanlong GU</td>
<td>Huazhong University of Science and Technology</td>
<td>François Jérôme</td>
<td>UMR 6503 CNRS-Université de Poitiers</td>
</tr>
<tr>
<td>3</td>
<td>Identification of AtLTP interacting protein in Arabidopsis thaliana</td>
<td>HU JIAN</td>
<td>China Agricultural University</td>
<td>Laurent DESLANDES</td>
<td>CNRS-INRA, LIPM</td>
</tr>
<tr>
<td>4</td>
<td>Application of molecular and isotopic markers to track the pollution sources in coastal sediment</td>
<td>Dongyan LIU</td>
<td>Yantai Institute of Coastal Zone Research, Chinese Academy of Sciences</td>
<td>Robert Galois / Pierre Richard</td>
<td>LIENSs CNRS-La Rochelle University</td>
</tr>
<tr>
<td>5</td>
<td>Study on the earthworm population, behavior and molecular stress responses</td>
<td>Yinsheng LI</td>
<td>Shanghai Jiao Tong University</td>
<td>Daniel CLUZEAU</td>
<td>Equipe RBPE, UMR CNRS EcoBio, Université de RENNES 1 ; Station Biologique</td>
</tr>
<tr>
<td>6</td>
<td>Exact and parameterized algorithms for independent set, vertex cover and some related problems</td>
<td>Mingyu XIAO</td>
<td>University of Electronic Science and Technology of China</td>
<td>Vangelis Paschos</td>
<td>LAMSADE, University Paris-Dauphine</td>
</tr>
<tr>
<td>7</td>
<td>Novel far-infrared glass fibres based on highly purified Te-chalcogenide glasses</td>
<td>Xunsi WANG</td>
<td>Ningbo university</td>
<td>XiangHua Zhang</td>
<td>University of Rennes 1</td>
</tr>
<tr>
<td>8</td>
<td>A data fusion approach in the context of a vision aided SINS/GNSS Ultra-tight Integrated Navigation System</td>
<td>Xinlong WANG</td>
<td>Beihang University</td>
<td>Jean-Yves Tourneret</td>
<td>University of Toulouse</td>
</tr>
<tr>
<td>9</td>
<td>Open innovation, globalization and absorptive capacity: The changing and interconnected strategies of French and Chinese telecommunication firms</td>
<td>Jun JIN</td>
<td>Zhejiang University</td>
<td>Edward Lorenz</td>
<td>University of Nice Sophia-Antipolis</td>
</tr>
<tr>
<td>10</td>
<td>Network configuration of technological activities and innovation performance in modular networks: an institutional comparison between France and China</td>
<td>Bin HAO</td>
<td>East China University of Science and Technology</td>
<td>Yannick Lung</td>
<td>Research Group on Theoretical and Applied Economics, University of Montesquieu-Bordeaux</td>
</tr>
</tbody>
</table>

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**SCIENCE FOUNDATION IN CHINA**
List of Projects Jointly Funded by NSFC
and ESRC in 2011

National Natural Science Foundation of China (NSFC) and the Economic and Social Research Council of UK (ESRC) jointly support research programs in the fields of economic restructuring, high education, skill labour migration and infrastructure provision. After evaluation and consultation, 3 projects are approved:

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<th>No.</th>
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<th>English PI</th>
<th>English Affiliation</th>
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<tr>
<td>1</td>
<td>Return Migrates and International Knowledge Flows: China and UK</td>
<td>Jiangyong LU</td>
<td>Peking University</td>
<td>Xiaohui LIU</td>
<td>Loughborough University Business School</td>
</tr>
<tr>
<td>2</td>
<td>CEO Effects on Firm Performance in China: the Role of Incentives, Firm Governance Arrangements and CEO Human Capital</td>
<td>Xianguo YAO</td>
<td>Zhejiang University</td>
<td>Alex BRYSON</td>
<td>National Institute of Economic and Social Research</td>
</tr>
<tr>
<td>3</td>
<td>Social Capital and Social Mobility – A Comparative Study between China and Britain</td>
<td>Haifeng DU</td>
<td>Xian Jiaotong University</td>
<td>Yaojun LI</td>
<td>University of Manchester</td>
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</tbody>
</table>

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Science Foundation in China

Science Foundation in China, which started publication in 1993, is the English edition of Bulletin of National Natural Science Foundation of China (in Chinese), an official journal of National Natural Science Foundation of China. It aims at publicizing the outstanding achievements in China's basic research, reviewing the strategy for the development of basic research, extending China's influence in international scientific and technological circles, and promoting international cooperation and exchange while at the same time introducing the supporting policy, the management and the operation of the National Natural Science Foundation of China, and enhancing and strengthening the understanding and contact with related international departments for the management of scientific research. This English journal is published each year in two issues.

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# List of Projects Jointly Funded by NSFC and RS in 2011

According to the agreement between the National Natural Science Foundation of China (NSFC) and the Royal Society of UK (RS), NSFC and RS jointly support exchange programs in 2011. After evaluation and consultation, 14 projects are approved:

<table>
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<tr>
<th>No.</th>
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<th>Chinese Affiliation</th>
<th>English PI</th>
<th>English Affiliation</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Femtosecond Laser Inscribed Active Optical Waveguides in Vanadate Laser Crystals</td>
<td>Feng CHEN</td>
<td>Shangdong University</td>
<td>Ajoy Kar</td>
<td>Heriot-Watt University</td>
</tr>
<tr>
<td>2</td>
<td>NMR Studies of Nanomaterials and the Role of Oxygen in Catalytic Processes</td>
<td>Luming PENG</td>
<td>Nanjing University</td>
<td>Clare Grey</td>
<td>University of Cambridge</td>
</tr>
<tr>
<td>3</td>
<td>Mechanochemical Synthesis of Metal-Organic Frameworks</td>
<td>Wenbing YUAN</td>
<td>Hainan University</td>
<td>Stuart James</td>
<td>Queen's University Belfast</td>
</tr>
<tr>
<td>4</td>
<td>A Study on the Mechanisms of Pile Failure during Seismic Liquefaction</td>
<td>Yu HUANG</td>
<td>Tongji University</td>
<td>Subhamoy Bhattacharya</td>
<td>University of Bristol</td>
</tr>
<tr>
<td>5</td>
<td>On Bottom Stability of Sumarine Pipeline due to Wave-Induced Liquefaction</td>
<td>Xianglian ZHOU</td>
<td>Shanghai Jiao Tong University</td>
<td>Dong-Sheng Jeng</td>
<td>University of Dundee</td>
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<tr>
<td>6</td>
<td>The self-assembly of Tropism Structural Conductive Nanofibre/hydrogels and the Response to Bio-Electricity</td>
<td>Yudong ZHENG</td>
<td>University of Science and Technology Beijing</td>
<td>Asim Ray</td>
<td>Brunel University</td>
</tr>
<tr>
<td>7</td>
<td>Stress Wave Propagation in Damaged Rock</td>
<td>Wancheng ZHU</td>
<td>Northeastern University</td>
<td>Qingming Li</td>
<td>University of Manchester</td>
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<tr>
<td>8</td>
<td>Increased Robustness and Practicability for Physical Modeling in Computer Graphics</td>
<td>Yongjin LIU</td>
<td>Tsinghua University</td>
<td>Chenfeng Li</td>
<td>Swansea University</td>
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<tr>
<td>9</td>
<td>Integrated Technique for Fast and Physics-Based Character Modeling and Animation</td>
<td>Xiaogang JIN</td>
<td>Zhejiang University</td>
<td>Lihua You</td>
<td>Bournemouth University</td>
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<tr>
<td>10</td>
<td>Grey System Theory and Computational Intelligence</td>
<td>Sifeng LIU</td>
<td>Nanjing University of Aeronautics and Astronautics</td>
<td>Yingjie Yang</td>
<td>De Monfort University</td>
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<tr>
<td>11</td>
<td>Investigation of Growth Factors in Chronic Thromboembolic Pulmonary Hypertension</td>
<td>Jun WANG</td>
<td>Capital Medical University</td>
<td>Lan Zhao</td>
<td>Imperial College London</td>
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<tr>
<td>12</td>
<td>Functional Roles of Olfactory Receptors and Odorant Binding Proteins in Wasp Micropli	s Mediator</td>
<td>Yuyuan GUO</td>
<td>Institute of Plant Protection, Chinese Academy of Agricultural Sciences</td>
<td>JingJiang Zhou</td>
<td>Rothamsted Research</td>
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<tr>
<td>13</td>
<td>Biomimetic Motion Learning Control of Robotic Exoskeleton Interacting with Human</td>
<td>Zhijun LI</td>
<td>Shanghai Jiao Tong University</td>
<td>Etienne Burdet</td>
<td>Imperial College London</td>
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<td>14</td>
<td>Physiological Consequences of Cardiac Na+ Channel Mutations</td>
<td>Aiqun MA</td>
<td>Xian Jiaotong University</td>
<td>James Fraser</td>
<td>University of Cambridge</td>
</tr>
</tbody>
</table>
List of Projects Jointly Funded by NSFC and RSE in 2011

The National Natural Science Foundation of China (NSFC) and the Royal Society of Edinburgh (RSE) jointly support exchange programs in the field of information sciences in 2011. After evaluation and consultation, 7 projects are approved:

<table>
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<tr>
<th>No.</th>
<th>Project Title</th>
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Rapid screening for hormonal pollutants in food by bionic photonic crystals and the mechanism investigation of combined effect at low-dose exposure to male
Gao Zjixian

The quick-screening for chemical contaminants/ mycotoxin-produced fungi in aquatic products/ farm products/ flavorings and the safety evaluations for harmful substances in foods
Zhang Lishi

Regulation of allergen induced toll-like receptor expression and cytokine release from mast cells by interferon-lambda
He Shaoheng

The effects and mechanisms MRP8/MRP14 on antigen presenting cells and T cells
Jiang Yong

Mechanism for TLR2 or TLR4 differentially regulating the development of tissue fibrosis
Hu Zhaowei

The molecular mechanism of citrullinated antigen in pathogenesis of rheumatoid arthritis
Li Zhan'guo

New mechanism of activated antigen presenting cell from the site of inflammation in rheumatoid arthritis promote Th17 responses
Zhu Ping

Specific inhibition of Dyrk1A prevents the formation of pathogenic tau in Alzheimer's disease brain
Liu Fei

Kir6.1/K-ATP channel: a new neuro-protective target for Parkinson's disease
Hu Gang

The effect of histamine and its receptors on astrocytes function and glial scar formation after cerebral ischemia and the involved mechanism
Chen Zhong

Neuroprotective mechanisms of Parkinson's disease and novel pharmaceutical targets research
Wang Xiaomin

Research of Etiology and Pathogenesis of Coronary Heart Disease from Blood-stasis to Toxin
Shi Dazhuo

Identification of the Molecular Signature Contributing to the Susceptibility of Phlegmatic Hygrosis Constitution to Metabolic Syndrome
Wang Qi

Study on mechanism of compatibility of two Zhimu herb-pairs based on analysis in vivo
Huang Chenggang

Basic research on composition law of herbal pair of herba ephedrae species
Luo Jiabo

·Research Results·

**Long-Range Topological Order in Metallic Glass**

In June 17th issue of *Science*, Professor Jiang Jianzhong of Department of Material Sciences, Zhejiang University and his colleagues published a paper titled “Long-Range Topological Order in Metallic Glass”. Prof. Jiang has received sustained support from NSFC since 2003.

This article was co-authored by an international group of 9 researchers.

According to the article, glass lacks the long-range periodic order that characterizes a crystal. In the Ce75Al25 metallic glass (MG), however, they discovered a long-range topological order corresponding to a single crystal of indefinite length. Structural examinations confirm that the MG is truly amorphous, isotropic, and unstrained, yet under 25 gigapascals hydrostatic pressures, every segment of a centimeter-length MG ribbon devitrifies independently into a face-centered cubic (fcc) crystal with the identical orientation. By using molecular dynamics simulations and synchrotron x-ray techniques, they elucidated that the mismatch between the large Ce and small Al atoms frustrates the crystallization and causes amorphization, but a long-range fcc topological order still exists. Pressure induces electronic transition in Ce, which eliminates the mismatch and manifests the topological order by the formation of a single crystal.