Achievements in Sino-German Interdisciplinary Major Research Project Published by *Small*

Aiming at solving the complex problems in the molecular assembly research, as well as developing the potential application prospect, NSFC (National Natural Science Foundation of China) and DFG (Deutsche Forschungsgemeinschaft), jointly funded the first interdisciplinary major international collaborative research project(multilayered molecular assemblies: structure, dynamics and function) in 2008. Led by Professor Zhang Xi from Tsinghua University, Member of CAS and Professor Harald Fuchs from University of Münster in Germany, the research team, composed of more than 10 professors from different research fields including chemical science, physical science, biological science and material science, conducted the collaborative research. Recently, *Wiley-VCH Small* published a special issue (Feb. 16, 2012) of the research findings in the chemical design of molecular assembly and solution assembly, surface and interfacial composite molecular assembly, and hybrid molecular assembly, which includes 2 literature reviews, 1 concept paper, 7 newsletters and 7 full papers.

This major international cooperation project sets a good example for the future Sino-German scientific collaboration, whose successful accomplishment derives from focusing on an important, long-term research topic, the complementary expertise and mutual trust among project PIs, and the communion and sparkling of different ways of thinking, as well as the previous cooperation background.

A Conserved Proline Switch on the Ribosome Facilitates the Recruitment and Binding of trGTPases

The process of protein synthesis in vivo is a highly complex and orderly system, which is dependent on the ribosome as factory, mRNA as a template, the amino acid as raw materials, the GTP for energy. Ribosomal protein synthesis is a continuous dynamics process, which involves not only the ribosome itself, but also involves the synergy of translation factors.

On 11th March 2012, Professor QIN Yan's group at the Institute of Biophysics, Chinese Academy of Sciences published an article in Nature Structural & Molecular Biology. This article, entitled "A conserved or proline switch on the ribosome facilitates the recruitment and the binding of trGTPases", reported a molecular mechanism of trGTPases integration and binding on the ribosome. QIN's group found that when elongation factor G (EF-G) binds to the ribosome, it first makes contact with the C-terminal domain (CTD) of L12 before interacting with the N-terminal domain of L11. They identified a universally conserved residue, Pro22 of L11, that functions as a proline switch (PS22), as well as the corresponding center of peptidyl-prolyl cis-trans isomerase (PPIase) activity on EF-G that drives the cis-trans isomerization of PS22. Only the cis configuration of PS22 allows direct contact between the L11 NTD and the L12 CTD. Mutational analyses of both PS22 and the residues of the EF-G PPIase center reveal their function in translational GTPase (trGTPase) activity, protein synthesis and cell survival in Escherichia coli. Their results demonstrated that all known universal trGTPases contain an active PPIase center. Their observations suggested that the cis-trans isomerization of the L11 PS22 is a universal event required for an efficient turnover of trGTPases, as part of the translation elongation cycle. These studies have shown that L11 22 Proline is a very important regulatory site in the process of protein synthesis and provide a new drug target for antibiotic synthesis.

This work was supported by grants from the National Natural Science Foundation of China, the Chinese Academy of Sciences and Ministry of Science and Technology of China.

Air Pollution Contributes in Sunshine Dimming in China

The research team led by Professor Yang Yonghui of Center for Agricultural Resources Research, Institute of Genetics and Developmental Biology, CAS, have revealed the magnitude and physical mechanism of the effect of air pollution on sunshine hours in 38 big cities across China. These results have recently been published in *Journal of Geophysical Research-Atmospheres* (VOL. 117, D00V14, doi: 10. 1029/2011JD016753). It was funded by international collaborative project from MOST and NSFC.

Solar radiation reaching the Earth's surface is the primary driver for life on our planet. Its variations can profoundly affect surface climate, hydrologic and carbon cycles, ecosystems and human activity. Global decline in surface solar radiation, the so-called "global dimming", has been noted since the 1950s. Dimming in solar radiation, may attenuate evaporation and its energy equivalent, the latent heat flux, and thus slow down the water cycle. This effect has been widely used to explain the "pan evaporation paradox" phenomenon, which is decreasing in pan evaporation in many regions of the world associated with global warming. Sunshine hours quantify the length of time in each day when direct solar radiation is greater than a certain threshold of 120 Wm^{-2}. Given records of sunshine hours span much longer than those of solar radiation, sunshine hours have been broadly used as a surrogate for solar radiation in studies of global dimming and brightening.

This research team observed a significant ($p<0.05$) decline in sunshine hours over 84% of China, mainly around Sichuan Basin (22.4%), North China Plain (18.8%), and Yangtze River Delta (18.2%), for the 1960s—2000s. This decline hits the strongest drop in the 1980s and the least in the 1990s. Among the seasons, largest sunshine hour decline occurs in winter (21.5%), followed by summer (17.7%), autumn (12.5%), and spring (6.9%).

API (Air Pollution Index) plays a negative role in regulating sunshine hours in China. In cities with average daily API$\leqslant$80 and$>$80 for the 2000s, sunshine hour decline is 0.8 h d^{-1}(13.4%) and 1.0 h d^{-1} (15.9%) respectively for the 1960s—2000s. In the season (winter) of greatest sunshine hour decline, API is of the highest level (90). Besides, the negative relationship between sunshine hours and API is particularly clear when the effects of precipitation and cloudiness on air pollutants and sunshine hours are excluded. Under clear-sky condition for 2001—2005, sunshine hours in days with API$>$80 are on the average 0.7 h d^{-1}(8.4%) shorter than those in days with API$\leqslant$80. API, as mass concentrations of aerosols/pollutants, may directly (radiation scattering and absorption) and indirectly (cloud condensation nuclei formation) reduce surface solar radiation, and thus shorten sunshine hours by weakening direct solar radiation needed to activate the Campbell-Stokes Sunshine Recorder.

This study proved the value of API as a separate indicator in studying the influence of air pollution on sunshine hour dynamics.

Role of Lymphatic Trafficking and Biodistribution

Funded by NSFC, Dr. Ma Yifan and his team of Center of Bio-sensing of Shenzhen Institute of Advanced Technology of CAS, made new progress in nano-vector vaccine and adjuvants system research. This achievement is to be published in SCI Journal *Vaccine*.

Lymph nodes (LNs) are peripheral lymphoid organs essential for vaccine-induced immune responses. Although cationic liposomes have been documented as a novel adjuvant and vaccine delivery system, whether enhancing LN targeting would improve the efficiency of cationic liposome-formulated vaccines has not been elucidated yet. In the present study we investigated the effect of PEGylation on LN targeting and the immunogenicity of cationic liposome-formulated vaccines. DOTAP cationic liposomes were incorporated with 1 or 5 mol% of DSPE-PEG2000 and labeled with near infrared fluorescent dyes. The lymphatic trafficking and biodistribution of different liposomes after subcutaneous (s. c.) injection were recorded using an in-vivo imaging system. The results showed that incorporation of 1 mol% DSPE-PEG2000 not only accelerated the drainage of DOTAP liposomes into draining LNs, but also prolonged their LN retention and enhanced liposome uptake by resident antigen-presenting cells. On the other hand, although incorporating 5 mol% of DSPE-PEG2000 into DOTAP liposomes enhanced their LN retention and uptake to a lesser extent, it prolonged blood circulation of DOTAP liposomes and increased their splenic accumulation. In addition, PEGylated DOTAP liposomes augmented primary and secondary anti-OVA antibody responses more potently than non PEGylated DOTAP liposomes did. Hence, incorporating a small amount of DSPE-PEG2000 into DOTAP liposomes not only increased the passive LN targeting of DOTAP-formulated vaccines but also modulated their biodistribution in vivo, which consequently improved the efficiency of cationic liposome-formulated vaccines.

Soft Fibrin Gels Promote Selection and Growth of Tumorigenic Cells

In a research project funded by NSFC, Prof. Wang Ning of Huazhong University of Science and Technology and Prof. Huang Bo of Tongji Medical College and their team obtained significant achievement, and published a paper on *Nature Materials* on July 1, 2012.

The identification of stem-cell-like cancer cells through conventional methods that depend on stem cell markers is often unreliable. We developed a mechanical method for selecting tumorigenic cells by culturing single cancer cells in fibrin matrices of ~100 Pa in stiffness. When cultured within these gels, primary human cancer cells or single cancer cells from mouse or human cancer cell lines grew within a few days into individual round colonies that resembled embryonic stem cell colonies. Subcutaneous or intravenous injection of 10 or 100 fibrin-cultured cells in syngeneic or severe combined immunodeficiency mice led to the formation of solid tumours at the site of injection or at the distant lung organ much more efficiently than control cancer cells selected using conventional surface marker methods or cultured on conventional rigid dishes or on soft gels. Remarkably, as few as ten such cells were able to survive and form tumours in the lungs of wild-type non-syngeneic mice.

Targeted Therapy: The New Lease on Life for Acute Promyelocytic Leukemia, and Beyond

Under a research project funded by NSFC, Prof. Chen Saijuan of Shanghai Jiaotong University Ruijin Hospital and Prof. Zhou Guangbiao of Institute of Zoology of CAS, published a review article entitled "Targeted therapy: The new lease on life for acute promyelocytic leukemia, and beyond" on *IUBMB Life*, 64(8): 671—675, 2012

Leukemia, a group of hematological malignancies characterized by abnormal proliferation, decreased apoptosis, and blocked differentiation of hematopoietic stem/progenitor cells, is a disease involving dynamic change in the genome. Chromosomal translocation and point mutation are the major mechanisms in leukemia, which lead to production of oncogenes with dominant gain of function and tumor suppressor genes with recessive loss of function. Targeted therapy refers to treatment strategies perturbing the molecules critical for leukemia pathogenesis. The t(15;17) which generates PML-RAR, t(8;21) that produces AML1-ETO, and t(9;22) which generates BCR-ABL are the three most frequently seen chromosomal translocations in myeloid leukemia. The past two to three decades have witnessed tremendous success in development of targeted therapies for acute and chronic myeloid leukemia caused by the three fusion proteins. Here, we review the therapeutic efficacies and the mechanisms of action of targeted therapies for myeloid leukemia and show how this strategy significantly improve the clinical outcome of patients and even turn acute promyelocytic leukemia from highly fatal to highly curable.

The Structural Basis for the Sensing and Binding of Cyclic di-GMP by STING

Under a research project funded by NSFC, Prof. Su Xiaodong and his team of the National Laboratory of Protein Engineering and Plant Genetic Engineering, BIOPIC, the School of Life Sciences of Peking University, obtained remarkable achievement and published recently a paper entitled "The Structural Basis for the Sensing and Binding of Cyclic di-GMP by STING" on online *Natural Structural* and *Molecular Biology*.

STING (stimulator of interferon genes) is an essential signaling adaptor that mediates cytokine production in response to microbial invasion by directly sensing bacterial secondary messengers such as the cyclic dinucleotide bis-(3′-5′)-cyclic dimeric GMP (c-di-GMP). STING's structure and its binding mechanism to cyclic dinucleotides were unknown. We report here the crystal structures of the STING cytoplasmic domain and its complex with c-di-GMP, thus providing the structural basis for understanding STING function.

Research on Atomic-Scale Investigation of Li Storage Mechanism in Spinel $Li_4Ti_5O_{12}$

Xia Lu Lin Gu* Yong-Sheng Hu* Hong Li and Liquan Chen

Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China

Nowadays, there is an increasing need for large-scale energy storage with the developments of renewable energy sources including solar and wind power. Among the candidates, Li-ion batteries have been regarded as one of the most important alternatives to power the electric vehicles (EVs) and/or to store electric energy in large-scale. Nonetheless, the performance of present Li ion batteries can still not meet the requirements for such applications. Spinel $Li_4Ti_5O_{12}$, with zero-strain characteristics and structural stability during charge and discharge process, plays a significant role in long-life Li-ion batteries. However, it is still under dispute on the reaction mechanism, charge compensation and gas-release (possible surface structure) in the $Li_4Ti_5O_{12}$ electrode during cycling. In order to further improve the battery performance, a more fundamental and microscopic understanding on the Li storage mechanism in $Li_4Ti_5O_{12}$ is essential.

Recently, PhD student Xia Lu, Prof. Yong-Sheng Hu *et al*. in Group E01 and Prof. Lin Gu in Group A01, from the Institute of Physics, CAS/Beijing National Laboratory for Condensed Matter Physics, revealed the full static atomic-scale picture of the spinel anode $Li_4Ti_5O_{12}$ for the first time using the latest spherical aberration-corrected scanning transmission electron microscopy (STEM) and electron energy loss spectroscopy (EELS) as well as the first-principles calculation. Firstly, the Li ions in $Li_4Ti_5O_{12}$ and inserted Li^+ ions can be directly visualized along the [110] direction using STEM-ABF technique (see Figure 1). Secondly, based on this, the two-phase reaction mechanism in this material can be well evidenced by the observation of $Li_4Ti_5O_{12}$ and $Li_7Ti_5O_{12}$ in the half discharged sample. More importantly, an atomic interfacial structure between two phases was clearly observed, where an almost ideal hetero-interface without any intermediate phase was developed, which is probably related to the zero-strain property of this material as shown in Figure 2. Thirdly, through atomic-scale EELS, the distribution of excess three electrons which are introduced by three Li insertion is inhomogeneous among five Titanium, meaning that three Ti^{4+} transform to Ti^{3+} while the other two keep Ti^{4+}. Finally, it is very interesting to note that we always found that the outmost surface structure with a thickness of 1—2 nm of $Li_4Ti_5O_{12}$ samples is very different from the bulk as shown in Figure 1. This layer is hardly identified and is quite probably related to titanium-rich compositions, which could be responsible for the gas-releasing issues (package swelling) when $Li_4Ti_5O_{12}$ is used as an anode in a real battery. The results were published on *Advanced Materials* (*Adv. Mater.*, 2012, 24: 3233—3238.). Upon publication, the work was immediately highlighted by *Science*.

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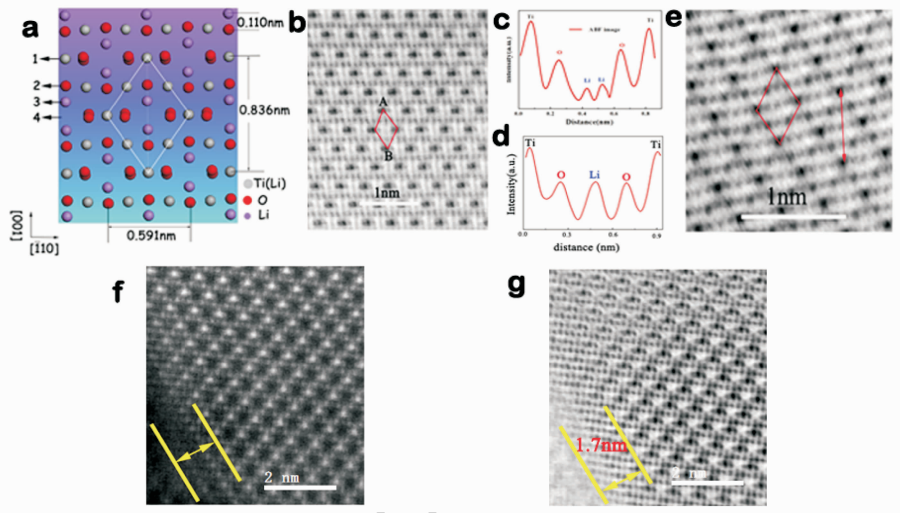

Figure 1. Lattice and STEM images for $Li_4Ti_5O_{12}$ at [110] zone axis. (a) Schematic lattice of $Li_4Ti_5O_{12}$. The numerical labels 1, 2, 3 and 4 in Figure 1a left viewed from [110] direction correspond to the 16d, 32e, 8a and 16c (vacancy) sites in $Li_4Ti_5O_{12}$ lattice. Enlarged ABF images of (b) $Li_4Ti_5O_{12}$ and (e) $Li_7Ti_5O_{12}$ with the corresponding line profile of (c) and (d), respectively. Enlarged HAADF (f) and ABF (g) STEM images of the irregular atomic arrangements in the outmost surface layer of the chemically lithiated $Li_4Ti_5O_{12}$ sample. (Note that in the ABF line profile, image contrast of the dark dots is inverted and displayed as peaks).

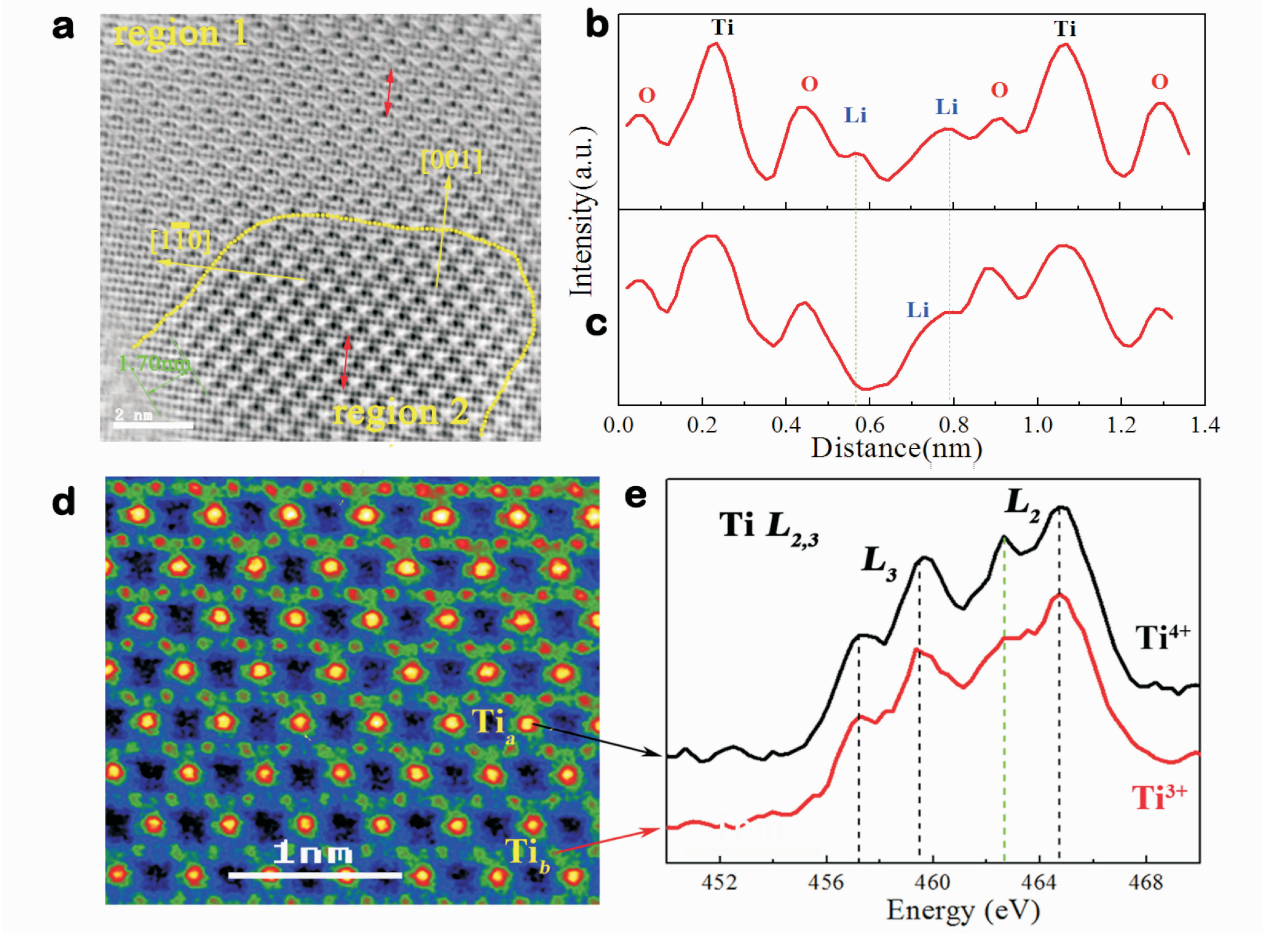

Figure 2. Interfacial structure in chemically lithiated $Li_4Ti_5O_{12}$ sample with about 0.15 mol Li insertion per formula unit at [110] direction. (a) ABF image near the interface between $Li_4Ti_5O_{12}$ phase (region 1) and $Li_7Ti_5O_{12}$ phase (region 2). The yellow dotted line indicates the boundary of the interface. (b) ABF line profile of region 1. (c) ABF line profile of region 2. (d) Color view of the enlarged STEM ABF image with different Ti columns. (e) EELS profile Ti-$L_{2,3}$ edges for the $Li_4Ti_5O_{12}$ electrode when discharged to 1.0 V taken from the two different Ti columns (d) along the [110] direction.

Acknowledgements

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The link for the paper

1. "Lithium Storage in $Li_4Ti_5O_{12}$ Spinel: The Full Static Picture from Electron Microscopy"

http://onlinelibrary.wiley.com/doi/10.1002/adma.201200450/abstract

2. Science Highlight:

http://www.sciencemag.org/content/336/6089/twil.full

NSFC Funded Project Made Significant Progress in Intelligent Nanomaterial and Device

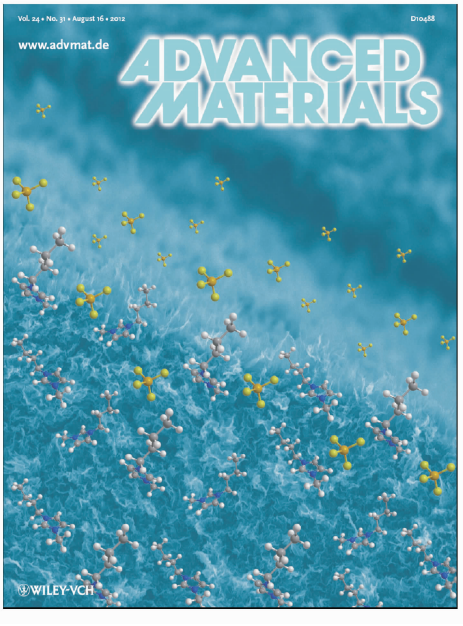
Suzhou Institute of Nano-Tech & Nano-Bionics, CAS

Smart and intelligent nanomaterials are currently in sharp focus in materials research as their properties are increasingly becoming more understood. Professor Wei Chen and his colleagues from Suzhou Institute of Nano-Tech & Nano-Bionics, CAS, have made significant progress in carbon nanotube/graphene based bio-inspired actuators.

Bio-inspired actuation materials, also called artificial muscles, have attracted great attention in recent decades for their potential application in intelligent robots, biomedical devices, and micro-electro-mechanical systems. Of all these materials, air operable ionic actuators have been intensively studied for their impressive actuation under very low voltage stimulation. A typical ionic actuator with bimorph structure is composed of one ion-conductive electrolyte membrane laminated by two electron-conductive electrode membranes, which can bend back and forth due to the electrode expansion and contraction induced by ion motion under alternating applied voltage. Its actuation performance is mainly determined by the electrochemical properties of both electrode and electrolyte materials. Traditionally, the utilized electrode materials are those metals such as gold, platinum, and silver. Although ionic polymer-metal composite (IPMC) actuators based on metal electrodes have been recently commercially available, persistent research is still ongoing to overcome their key defects. For instance, cracking of metal electrodes would lead to an undesired decrease both in actuation performance and cyclic stability.

The discovery of one dimensional carbon nanotube (CNT) and two dimensional graphene has created a revolution in functional nanomaterials. Their unique structures render them intriguing anisotropic mechanical, thermal and electrical properties. Moreover, the combination of these two carbon nanomaterials may obtain macroscopic multi-dimensional ordered structure and show large property enhancement, which makes them the ideal materials in high-performance composite materials.

In 2010, Chen's group has reported large-scale aligned 1D carbon nanotube and 2D graphene from their purified, highly concentrated suspension (*ACS Nano*, 2010, 4, 1042; *ACS Nano*, 2010, 4,3498). Based on the Liquid Crystalline property of carbon nanotubes and graphenes, flexible CNT- and graphene-based electrode materials were developed. Since then, the team successfully achieved in constructing sandwich-like macroscopic actuator from nature polymer, CNT and ionic liquid. This composite ionic actuator exhibits high biocompatibility, and considerable bending actuation performance at low applied voltage (<3 V), which was published on *Adv. Mater.*, 2010, 22, 3745 and highlighted in the topic "Artificial muscles: Closer to nature" by *Nature Asia* (Nature Publishing Group). Actually, large volume variation of electrode materials is desirable in designing artificial actuator. Furthermore, Graphene nanosheet membrane of paralleled structure is found to be able to provide large volume variation as high as 98% by controlling its interspace distance through ionic liquid pre-expanding treatment(*Chem. Commun.*, 2012, 48, 3978).



Recently, based on these works, the researchers aim to exploited synergistic stress-strain reinforcement effect of full carbon composite electrode. Highly stable air working bimorph actuator based on a graphene nanosheet/carbon nanotube hybrid electrode is developed, which exhibits attractive actuation response and durability even after a million times cycle, as reported by Wei Chen and co-workers on page 4317 of *Advanced Materials*, 2012, 24, 4317 (Inside Front Cover, see the inset figure). Studies show that graphene oxide (GO) preserves hydrophobic π-conjugated structure, as well as a large quantity of oxygen-containing functional groups. Thus it is suitable to act as an excellent dispersant for preparing a uniform porous full-carbon electrode. Obviously, the full carbon porous electrode was prepared through a surfactant free solution method just by utilizing π-π interaction, effectively preventing graphene from restacking while obtaining high electrical conductivity and 3D structure stability, showing great promise in intelligent materials and electronic devices for energy harvesting, storage and conversion.

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[2] Large volume variation of anisotropic graphenenanosheet electrochemical-mechanical actuator under low voltage stimulation, Luhua Lu, Ying Hu, Jinghai Liu, and Wei Chen*, *Chem. Comm.*, 2012, 48, 3978.

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[5] Electromechanical Actuation with Controllable Motion Based on a Single-Walled Carbon Nanotube and Natural Biopolymer Composite, Ying Hu, Wei Chen* et. al., ACS NANO, 2010, 4, 3498.

Palaeobotany and the Evolution of the Monsoon in China

Frédéric MB Jacques

From October 2009 to October 2011, I worked as a fellow of the International Young Scientist Program from the Chinese Academy of Sciences, at the Nanjing Institute of Geology and Palaeontology, the Chinese Academy of Sciences. My research was funded by the National Natural Science Foundation of China. My research focused on the study of Cenozoic palaeoenvironments in China based on fossil plants.

Palaeoenvironments consist of biotic and abiotic factors. I worked on two important aspects of the palaeoenvironment: the climate as an abiotic component of the environment, and, the vegetation as a biotic component. A clear and long-studied link between the leaf physiognomy of a flora and its climate allows for the reconstruction of the palaeoclimate from fossil leaves. The CLAMP method (Climate Leaf Analysis Multivariate Program) reconstructs 11 climatic parameters, related to both temperature and precipitation, based on 31 leaf physiognomic characters. When this method was applied to Chinese palaeofloras, the results for precipitation related parameters were striking and unrealistic. The modern calibration dataset in CLAMP included no Chinese sites or sites with a strong monsoonal signal. In such conditions, CLAMP was unable to reconstruct seasonality in precipitation. In order to overcome this problem, we included 45 modern Chinese floras in the calibration dataset. The Chinese floras occupied a new part of the physiognomic space. A cross-validation test demonstrated that the resulting new calibration was efficient in reconstructing Chinese climates and especially the seasonality in precipitation, i. e. the monsoon. Results from this new calibration on Chinese palaeofloras gave more realistic results.

This model was then applied to an old fossil leaf assemblage collected by Chinese colleagues on King George Island in Antarctica during the 80s. This early-middle Eocene flora consists of 25 morphotypes of fossil dicotyledonous leaves and some gymnosperms, and was therefore suitable for palaeoclimate reconstruction using CLAMP. It has long been established that Antarctica had a warm humid climate during the Paleogene with seasonality in precipitation; however, this seasonality was not characterised as summer-wet or summer-dry. In order to understand this seasonality, we introduced two new climatic parameters in CLAMP: daily summer precipitation, and, the ratio of summer precipitation. These two parameters were chosen because they are used to define the monsoon summer rainy season domains on a global scale. Our reconstruction indicated a rainfall rate of 6.4 mm/day during the summer, representing more than 60.3 % of the annual rainfall. These two values combined demonstrate the existence of a monsoon climate at high latitude during the early-middle Eocene. These results give new perspectives on the mechanisms that may explain the discrepancy between the proxy results and model results for this time interval.

I also focused on the palaeovegetation of China during the Neogene, when the Chinese vegetation was already influenced by the monsoon. Among the several methods that allow palaeovegetation reconstruction we chose the Integrated Plant Record (IPR) because assemblages of different organ types (leaf, seed, pollen, wood) can be studied at the same time. In this method, each taxon present in the fossil assemblage is coded according to the taxonomic, physiognomic and autecological characteristics of its nearest living relative. The percentage of each component in the flora indicates the vegetation type. I worked on 71 palaeobotanical sites. The east-west wet-dry gradient shows variation in strength during the Neogene. However, we can still recognize an aridification episode during the Pliocene in western regions of China.

During my stay in Nanjing Institute of Geology and Palaeontology, I was very happy to apply methods developed in Europe and the US to Chinese materials, and improve these methods to better fit the Chinese geological context.

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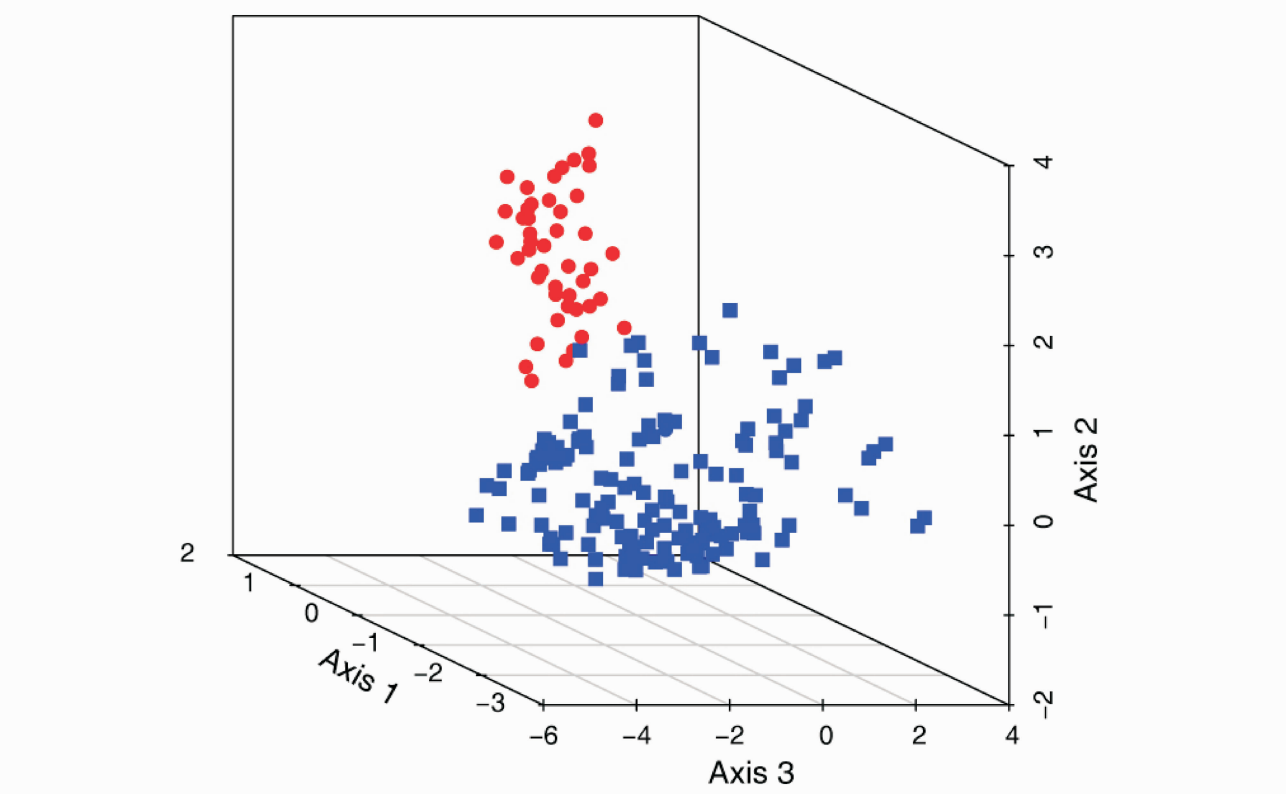
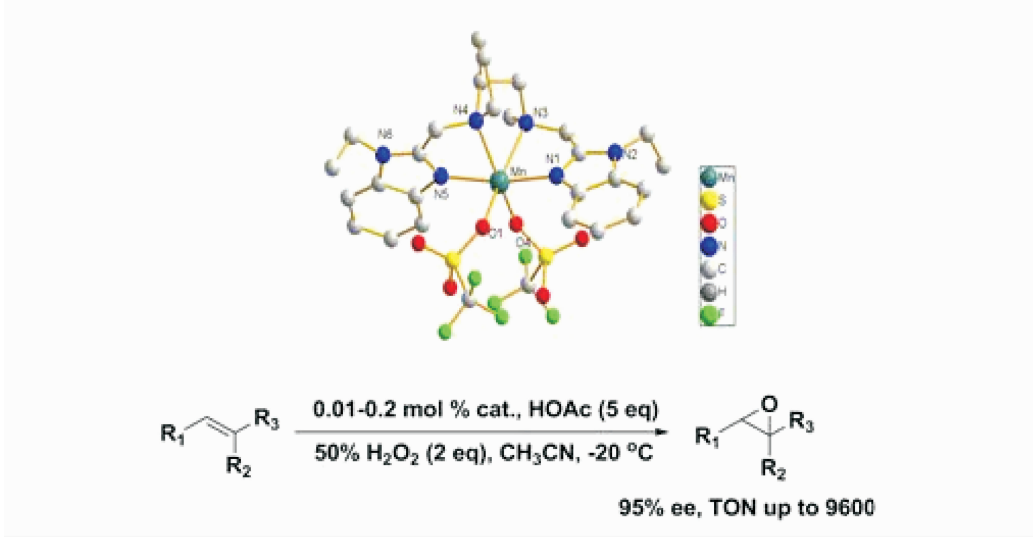


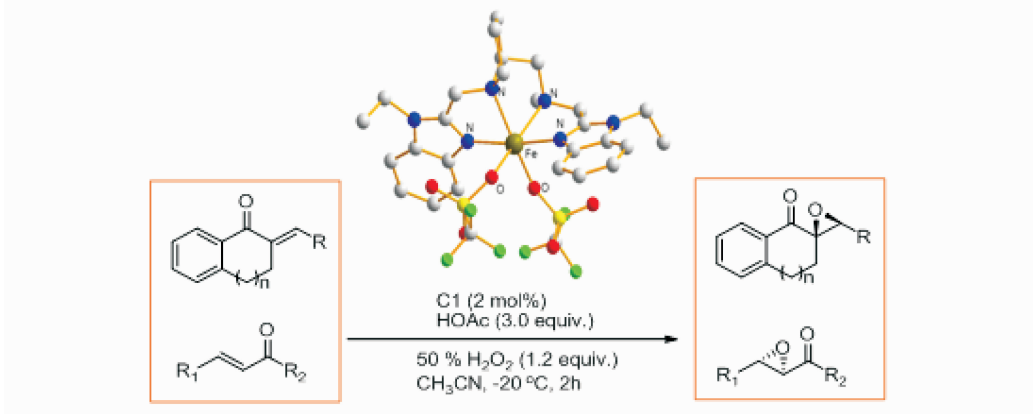
Fig. 1. Three-dimensional view of the physiognomic space. China is in red, other sites in the calibration are in blue. Chinese sites plot outside the cloud of the other sites demonstrating that the physiognomy of Chinese floras is different from that of other regions in the world.

Non Heme System Asymmetric Epoxidation Reaction Made Progress

Funded by the National Natural Science Foundation of China and the Chinese Academy of Sciences "Hundred Talents Program", the Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences Oxo Synthesis and Selective Oxidation State Key Laboratory of biological and Biomimetic Catalytic task group has recently developed a new type of non heme enzyme simulation system, the system uses the benzimidazole instead of four nitrogen ligands pyridine units, natural proline derivatives two amine instead of HMDA skeleton, the manganese complexes in asymmetric epoxidation reaction shown high activity, but in 1/10000 the amount of catalyst under conditions of high selectivity to obtain corresponding product, TON (Turnover numbers) up to 9600, TOF (Turnover frequency) up to 59000 h-1. It is currently reported the highest activity in epoxidation catalyst. Use the H2O2/ AcOH or peracetic acid as oxidant, 18O isotope labeling experiments, were found different degrees of 18O isotope labeling of epoxy products, won the first direct evidence of response is obtained by the high Mn=O intermediates in the process, the work was published recently in *Chem. Eur. J.* (*Chem. Eur. J.* 2012, 18, 6750—6753.).

Iron is the most abundant in the earth's crust one of the metal elements, and less toxicity. From the angle of green chemistry in chemical, sustainable, development of iron catalyzed organic reactions have very important significance. So far, iron catalyzed asymmetric epoxidation of successful examples of minimal. Oxo Synthesis and Selective Oxidation State Key Laboratory of Biological and Biomimetic Catalytic task group to use the same four nitrogen ligand complexes of iron, the successful implementation of the three substituted cyclic ketene and chalcone derivatives in asymmetric epoxidation reaction, catalyst quantity is 2 mol%, enantioselectivity can be as high as 98% EE, 18O isotope experiments also show that, in the reaction system of accession to the H218O, as can be observed in 18O labeled epoxy products, through the determination of the iron complexes crystal structure, found the complexes is cis-α configuration. The near future as the cover article published in the *Chem. Eur. J.* (*Chem. Eur. J.* 2012, 18, 7332—7335.).

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HOAc (3.0 equiv.)
50 % H_2O_2 (1.2 equiv.)
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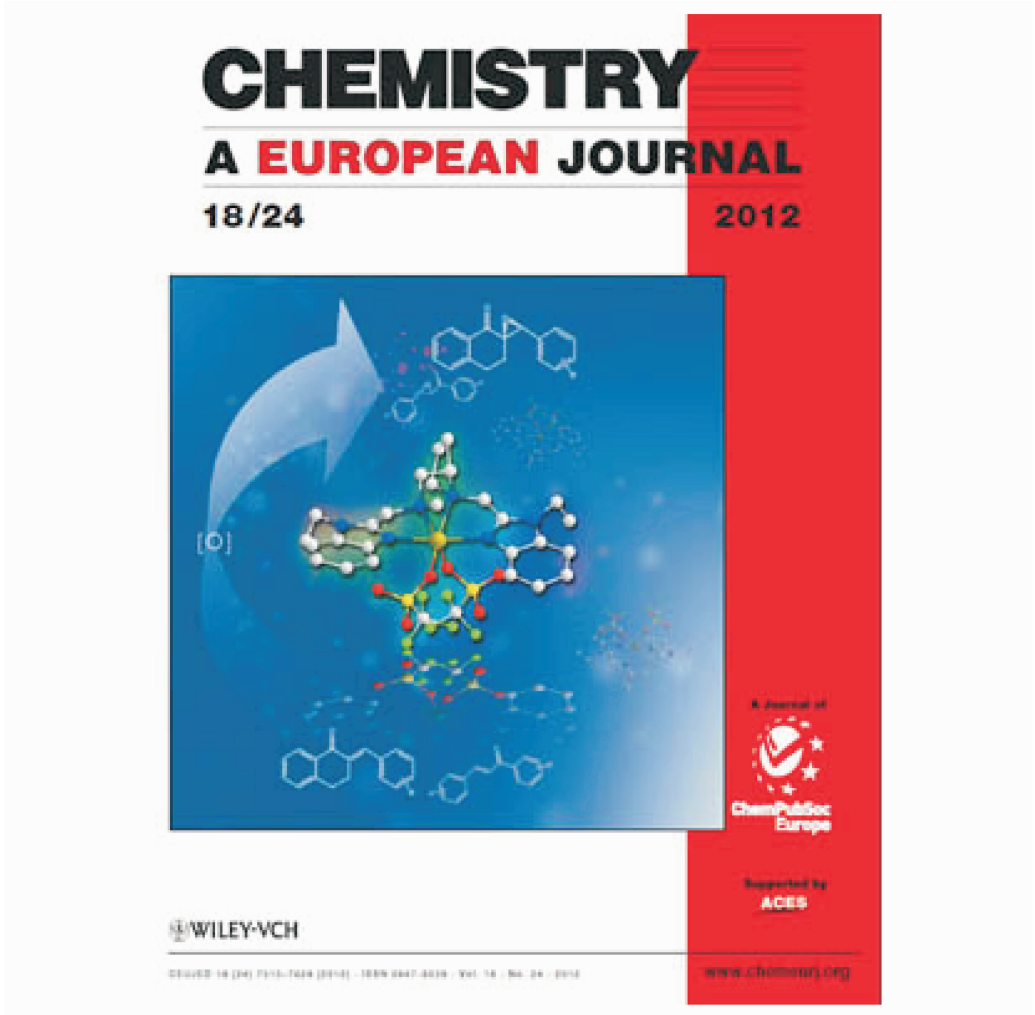
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Rapid Advancement of Immunology Study in China

The world-renowned *Cell Press* recently released a new informational supplement—Spotlight on China—to introduce the rapid developments in the basic and clinical researches in immunology in China. The electronic version of the supplement can be viewed or downloaded for free on the website of the *Cell Press* (http://www.cell.com/spotlightonchina), and the hard copy will be published along with the new issue of *Immunity* in November.

In the preface of the supplement, Prof. Xuetao Cao, President of the Chinese Academy of Medical Sciences and President of the Chinese Society for Immunology, highlighted the Chinese traditional philosophy of "Yin and Yang", the contribution and influences of traditional Chinese medicine to the development of western medicine and the emergence of modern immunology. He further introduced the development of immunology in China and specifically pointed out the great support and leading role of NSFC to the development of immunology in the country. He also outlined the prospect and directions of immunology research in the future.

As an informational supplement to the journal *Immunity* of the *Cell Press*, Spotlight on China introduces the achievements, research trends and future research directions by Chinese scientists in innate immunity (non-specific immunity), specific immune responses, immune regulation, autoimmune diseases, tumor immunity and immune properties of stem cells to readers around the world. Besides, it also introduces the Chinese Society for Immunology and leading Chinese immunology research bodies and teams including the Second University of Military Medical Sciences, the University of Science and Technology of China, Institute of Biophysics, CAS, the Chinese Academy of Medical Sciences, and Peking University.

According to Dr. Yang Xiaohong, senior editor and responsible person for China and Asia-Pacific region at *Cell Press*, this is the second time for the *Cell Press* to publish Spotlight on China. The spotlight series is an unprecedented introduction to a specific country or region since the establishment of the *Cell Press* in 1986. The first Spotlight on China published last year gave emphasis to the progress in cancer research in China. Looking into the future, the *Cell Press* will continue to strengthen the dialogue and cooperation with Chinese researchers and research institutions, promote the recognition of the systematic and innovative researches of Chinese scientists by the international community, and contribute to the continuous progress and leap-forward development of biomedical basic researches and transformation in China.

Chinese Experts Successfully Produced Transgenic Animals from Haploid Embryonic Stem Cells

Individual animals produced by haploid stem cells are ideal models for studying recessive genes. Haploid stem cells not only can maintain haploidy, but also are capable of replicating themselves infinitely. Modified genes can be passed on to future generations through genetic engineering of haploid embryonic stem cells, which thus avoids the germlinechimerism caused by other transgenic methods and greatly improves the analysis efficiency of the function of gene modification. However, natural haploids are only restricted to germline cells in mammals. Currently in mammals, only the embryonic stem cells in rats and mice can be used as the carrier of gene modification, but the embryonic stem cells of other mammals, including primates, cannot guarantee germline transmission, which has seriously hindered the establishment of disease models by using these species.

Prof. Zhou Qi and Prof. Zhao Xiaoyang of the Institute of Zoology, Chinese Academy of Sciences, successfully established androgenetic haploid embryonic stem cell lines in transgenic mice and proved that the ahES cells can produce zygotes and live decedents, functionally similar to gametes. Their research results were published in *Nature* online on September 30, 2012.

The technology of using haploid stem cells for inheritable gene modification raised the possibility of surpassing the difficulty in producing stably inheritable non-rodent genetically modified animals and provide a new approach to produce disease models for the study of gene functions for primates and other large animals. It may also contribute to the development of new medicines and the study of the pathogenesis of many diseases, and shed new light on the identification of human disease genes and gene augmentation through assisted reproduction.

The research was supported by a key project within the Major Research Plan "Epigenetic Mechanism of Cell Programming and Reprogramming" of the National Natural Science Foundation of China.