香港中文大學理學院
Faculty of Science, CUHK

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理學院通訊
Newsletter

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Six CAS Academicians Visit CUHK

The fourth Chinese Academy of Sciences (CAS) Academicians Visit Programme was held on 21-25 February 2011. The delegation included six CAS academicians: (top from left) Prof. ZHU Daoben, Institute of Chemistry, CAS; Prof. CHENG Jinpei, Ministry of Science and Technology; Prof. HONG Maochun, Fujian Institute of Research on the Structure of Matter, CAS; (bottom from left) Prof. GE Molin, Chern Institue of Mathematics, Nankai University; Prof. CHAI Zhifang, Institute of High Energy Physics, CAS; and Prof. TAO Shu, College of Urban and Environmental Sciences, Peking University.

The six academicians delivered public lectures in the 'Lecture Series by Academicians' on 22-23 February, sharing their expertise and views on myriad fields covering theoretical physics, organic chemistry, physical chemistry, and control of organic pollutants. Over 200 people including academics, researchers ,and students from CUHK and other universities as well as members of the public attended the lectures. The delegates paid a visit to the Faculty of Science and toured research facilities to learn about the latest research development of the Faculty and the University. While visiting the Faculty, the academicians joined a seminar with faculty members to discuss the latest scientific research developments. On 24 February, the Faculty of Science held a farewell luncheon with the six academicians and together celebrated a successful visit.

Science faculty members gathered to conduct meaningful academic exchange with the six visiting CAS academicians on 23 February.

Faculty Receives Two National Scientific Research Awards

Two remarkable scientific research projects of the Science Faculty received the Higher Education Outstanding Scientific Research Output Awards (Science and Technology) in the category of natural sciences from the Ministry of Education (MOE). Ms. ZHOU Jing, deputy director-general of the Centre for Science and Technology Development of MOE, was invited to host the award presentation ceremony held in the Lecture Theatre of Shaw College on 1 March.

Prof. WEI Juncheng of the Department of Mathematics won a first-class award with his project "Concentration Phenomena in Nonlinear Elliptic Equations and Systems." His exhaustive research in the concentration phenomenon has brought a complete solution to a long standing and unsolved problem in pure and applied science. Having won recognition from the leading mathematics journal *Annals of Mathematics* for his revolutionary research findings, he became the only mathematician from Hong Kong to have published in this journal. Professor Wei's research has made great contributions to mathematical biology and materials science by explaining how diverse patterns in nature are formed and helping to design medical implantation of specific surface properties.

The project receiving a second-class award was "Cholesterol-lowering and Cardiovascular Functional Foods and Nutraceuticals" conducted by **Prof. CHEN Zhenyu** of the School of Life Sciences and Prof. HUANG Yu of the School of Biomedical Sciences.

The Higher Education Outstanding Scientific Research Output Awards are granted to research selected by experts from the same fields as the candidates. In 2010, a total of 304 research projects were awarded, of which 48 and 83 projects received first-class and second-class awards respectively in the category of natural sciences.

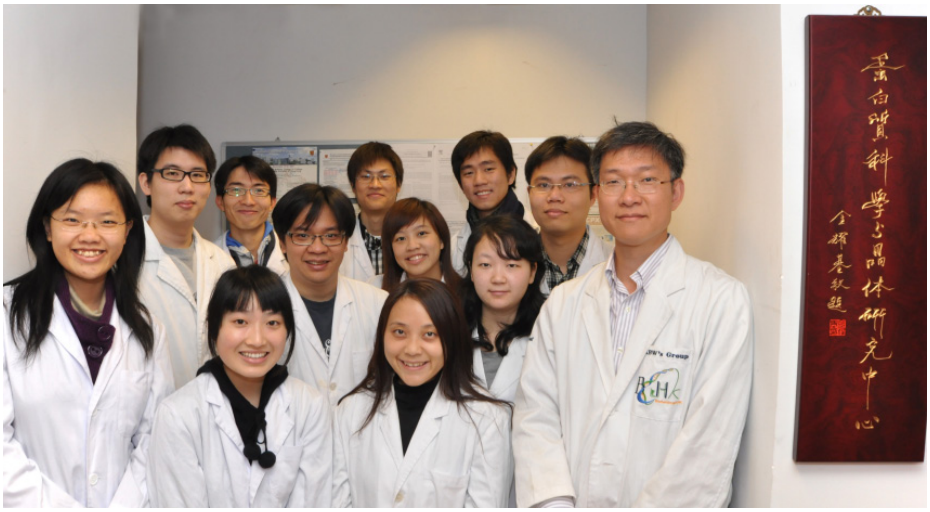
Five CUHK professors receive the Higher Education Outstanding Scientific Research Output Awards from the Ministry of Education (from left): Prof. WEI Junchengi (Department of Mathematics), Prof. YU Jun, Prof. Joseph SUNG JY, Prof. CHEN Zhenyu (School of Life Sciences) and Prof. HUANG Yu.

School of Life Sciences Research Paves Way for Development of Better Biotech Enzymes

A research team led by **Prof. WONG Kam-bo** of the Centre for Protein Science and Crystallography, School of Life Science, demonstrated a fundamental principle in changing the activity of enzymes by means of protein engineering. The findings will provide potential insights into the future design of biotechnologically important enzymes, and was published in the March issue of *PLoS Biology*, the top ranking journal in biology.

Proteins from thermophiles, organisms that live in high temperatures, are more resistant to heat denaturation than those from mesophiles, organisms that live in moderate temperatures. In nature, enzymes from microbes that thrive in extremely hot habitats like hydrothermal vents can remain stable even at 100°C. These thermophilic enzymes are useful for the biotech industry because of their superior stability.

Professor Wong's research team has been working on thermophilic proteins for more than 10 years. One intriguing problem is that thermophilic enzymes are less active than their mesophilic homologs despite having similar structures. In the study published in *PLoS Biology*, his research team used the technique of protein engineering to investigate why thermophilic enzymes are less active. They discovered that thermophilic acylphosphatase has a unique property in that its active site is rigidified by a salt-bridge. 'Thermophilic enzymes tend to have more stabilizing interactions like salt-bridges. Just like one could use more screws to stabilize a wardrobe,' said Professor Wong. By removing this salt-bridge, his team converted thermophilic properties of acylphosphatase to mesophilic-like properties. Likewise, a mesophilic acylphosphatase from human was engineered to become thermophilic-like by introducing the salt-bridge. Professor Wong's team concluded that the rigidifying salt-bridge increases the activity of enzymes at high temperatures, but at the same time scarifies the activity at low temperatures. The principles learned from Professor Wong's study will hopefully guide the improvement of enzymes in the biotech industry.

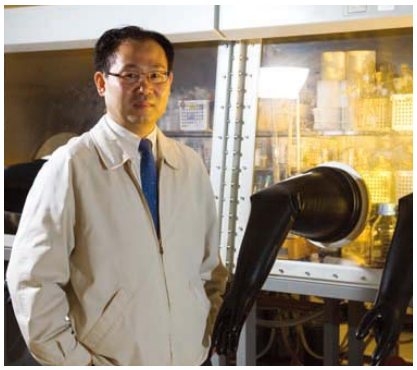


Prof. WONG Kam-bo (right) and his research team at the Centre for Protein Science and Crystallography, CUHK.

Chemistry Staff Research Achievements

Two Chemistry faculty members were recently recognized for their contribution to the advancement of scientific knowledge. **Prof. Jimmy YU Chai-mei**'s paper "Design, Fabrication, and Modification of Nanostructured Semiconductor Materials for Environmental and Energy Applications" published in *Langmuir*, one of the top journals of chemistry, was one of the most-read articles of the journal in 2010. His article provides a comprehensive overview of the recent progress in the design, fabrication, and modification of nanostructured semiconductor materials for environmental applications.

Prof. Jimmy YU Chai-mei



Prof. XIE Zuowei

A research team led by **Prof. XIE Zuowei** discovered that reactive boron-carbon clusters called carborynes, $C_2B_{10}H_{10}$, which are in effect three-dimensional versions of benzyne, can exist in two resonance forms that exhibit significantly different reactivity patterns. This discovery - recently featured in *Chemistry & Engineering News* - could serve as a new strategy for generating functionalized carboranes, which feature extensively in the synthesis of polymers, ceramics, catalysts, and radiopharmaceuticals.

Mathematics Professors and Students Win Awards

Two professors and eight students from the Department of Mathematics and the Institute of Mathematical Sciences seized key accolades of a number of internationally prestigious awards for their remarkable achievements in the discipline.

Prof. LAU Ka-sing, chairman of the Department of Mathematics said, "The department is always devoted to bringing in the best teachers and nurturing young talent. Their accomplishments have further affirmed our leading position among top institutions in the field of mathematics."

Prof. WEI Juncheng, Professor of Mathematics, was awarded the 2010 Morningside Silver Medal of Mathematics for his achievements in semi-linear elliptic equations. The medal is awarded to exceptional Chinese mathematicians under the age of 45 for their seminal achievements in pure and applied mathematics.


Prof. WEI Juncheng

Prof. Conan LEUNG Nai-chung at the Department of Mathematics and Institute of Mathematical Sciences was awarded the 2010 Chern Prize in recognition of his significant research contributions in the study of mirror symmetry and quantum cohomology. Presented every three years, the prize is awarded to Chinese mathematicians who have made exceptional contributions to mathematical research or to public service activities in support of mathematics.


Prof. Conan LEUNG Nai-chung

Five undergraduate, master, and PhD mathematics students received the New World Mathematics Awards (NWMA) for their outstanding theses. They include **CHAN Kwok-wai**, winner of Doctor Thesis Awards - silver prize, currently a postdoctoral fellow in Kyoto University; **Edward FAN Sin-tsun**, and **NG Ka-shing**, winners of Master Thesis Awards - silver prizes, currently PhD students at the California Institute of Technology and the University of Waterloo respectively; **Theodore HUI Heung-shan** and **LAM Ka-kit**, winners of Bachelor Thesis Awards - gold prizes, currently fourth-year mathematics students.

NWMA is sponsored by New World Development Company Limited and China Young Leaders Foundation, organized by the Tsinghua University and co-organized by the International Congress of Chinese Mathematicians. Winners are selected by review committees formed by world-renowned mathematicians among submissions from Chinese undergraduate, master, and PhD mathematics students from around the world.

YEUNG Wai-kit, an undergraduate mathematics student, was awarded the Chern Medal - bronze medal at the S.T. Yau College Student Mathematics Contests, with contestants coming from reputable institutions including Peking University, Fudan University, Tsinghua University and Taiwan University. He also received an honourable mention in the subject of Analysis and Differential Equations with another student **SHI Fanye**.

WANG Xinyang, also an undergraduate mathematics student, together with two of his secondary school classmates, earned a Meritorious Winner award in the 2010 Consortium for Mathematics and Its Applications (COMAP) Mathematical Modeling Contest. Their report addressed the problem of providing a local police agency with a method to aid in their investigations of serial criminals. Since 1980, COMAP has worked with teachers, students, and business people to create learning environments where mathematics is used to investigate and model real issues in our world.

Ensuring Trees are Safe and Healthy

There has been growing public concern over falling trees in Hong Kong, which have claimed a few lives. Yet ironically, falling trees are often the victims of man - rapid urban development coupled with lack of knowledge, and improper pruning and transplanting.

In view of this, **Prof. CHIU Siu-wai** of the Biology Programme, School of Life Sciences, with researchers from the Institute of Horticulture Science of Hong Kong and the Landscaping Section of the Estates Management Office, carried out a study on tree health in Hong Kong. Problems are identified and solutions are proposed to improve tree care. The team pointed out that currently the government has no strategy for the sustainable management of trees, no training of expertise in this area, and little knowledge of how to deal with pests. Infrastructural projects are not being monitored by tree professionals, and there are no criteria for preserving, felling or transplanting trees.

They believe that Hong Kong urgently needs a long-term vision on tree management, and such a strategy should start from species selection. Hong Kong still depends heavily on the growing of exotic species, despite the global trend of conserving native species. With the eventual aim of contributing to the building of a Hong Kong tree health database, the Landscaping Section and the School of Life Sciences conducted a study to examine the growth of two species of trees, namely, the exotic *Araucaria heterophylla* commonly found in parks and residential compounds, and the native *Cinnamomum camphora*. If it materializes, the database will serve as an information and monitoring system.

The study has also proposed the use of a mallet method for preliminary tree examination. Currently the method adopted is visual assessment. Going green is not enough. The question is how do we stay green?

Credit: Sustainable Campus Winter 2010; for the full issue, please click here.

Using different methods to assess the density of a tree in order to determine the extent of internal decay: (left) Mallet method; (centre) Resistograph; and (right) sonic tomograph.

The 6th Lau Oi Wah Memorial Science Lecture Series

On 2 April 2011, The 6th Lau Oi Wah Memorial Science Lecture Series was held successfully. This year, the event drew nearly 500 secondary students and teachers to hear four talks given by student-winners of the 2010 iGEM competition and teachers from various disciplines of science. During the event, students listened to the talks intently and asked questions enthusiastically.

The Lau Oi Wah Memorial Science Lecture Series is co-organized by the CUHK Faculty of Science and The Lau Oi Wah Memorial Fund. This meaningful event aims to bridge the distance between cutting-edge science and young people with a keen interest

in science, carrying on the mission of the late former Dean of Science, Prof. LAU Oi-wah.

Below are select highlights of this year's event:

Prof. NG Cheuk-yiu, Dean of Science, takes a photo with the speakers at this year's event.

Members of the audience were invited to help bring Physics knowledge to life.

For full details and photo highlights of this year's event, please visit the event website.

Chemistry Retired Staff Homecoming

On 11 February, the Department of Chemistry welcomed back a number of its retired staff in celebration of the Year of the Rabbit. It is worthy to note that some of the returning retired staff had served the department for more than 30 years, and their dedication and loyalty are much appreciated.

(front row, left to right): Mr. YH LAW, Prof. PK HON, Mr. Shum, Prof. SW Tam, Mrs. Yau, and Ms. Yip.
(back row, left to right): Prof. KH Lee, Mr. HK Cheung, Prof. NC Wong, Prof. CY NG, Prof. TL Chan, Prof. CW Mak, Prof. HF Chow, Prof. WK Li, and Mr. MC Wong.

Funding Opportunity

The Knowledge Transfer Office (KTO) is currently calling for applications to the **Patent Application Fund (PAF)** and the **Technology and Business Development Fund (TBF)**. First round funding applications are due by 30 April 2011. For enquiries, please call 2696 1578 or email kto@cuhk.edu.hk.

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