Mr Wong Yan-lung (second from right), Secretary for Justice of the HKSAR Government, presents the Croucher Award to Prof. He (second from left).

Neuroscientist Wins Croucher Award

Prof. He Jufang of the Department of Rehabilitation Sciences was recently presented the Senior Research Fellowship of The Croucher Foundation in recognition of his achievements in the international scientific community.

Prof. He is one of the leading neuroscientists in the hearing research and thalamocortical system, especially in the corticofugal modulation. He has received training in both engineering and medical sciences and obtained two doctoral degrees.

Prof. He's main research interest is in systems neuroscience. He combines electrophysiological, anatomical and engineering approaches to investigate the fundamental questions of hearing, sleeping, learning and memory. He was invited to speak at the Cold Spring Harbor Conference for his pioneer work in temporal processing.

Another line of his study is in functional substitution for people with disabilities using electronic devices and neurorehabilitation. He has established PolyU's Applied Neuroscience Laboratory to support his research work and investigate fundamental questions in neuroscience. Last year, a part of his laboratory, in visuo-auditory integration, was made a joint-laboratory between the Chinese Academy of Sciences and PolyU.

Prof. He and his colleagues have developed the first telemetric system for measuring blood flow velocity and ECG from human subject during exercise. He is also renowned for inventing the "Electronic Bat Ears" for people with visual impairments. The "Bat Ears" is a new echo-location device which employs the unique characteristic of ultrasound.

The bouncing signal of the ultrasound is translated into a low frequency sound which a normal person can hear and bear. People with visual impairments are able to generate a mental image of the surrounding after receiving short training. Its ultimate goal is to provide an effective navigation system similar to that of a bat for the visually impaired.

Recently his team has developed an electronic gadget to connect the cortical motor neurons with the spinal cord motor neurons for people with injured spinal cords.

Prof. He obtained B.Eng. and M.Eng. degrees from Harbin Institute of Technology, a Doctoral Degree in Medical Science from the University of Tokushima, and a second Doctoral Degree in Engineering from the University of Tokyo, both in Japan. Before joining PolyU as Assistant Professor in September 1998, he worked at RIKEN, a large natural sciences research institute in Japan, the University of Tokushima, and Advanced Research Laboratory of Hitachi in Japan.

Prof. He has been contributing to top journals, such as the Proceedings of *the National Academy of Sciences, the Journal of Neuroscience, the Journal of Physiology, and the Journal of Neurophysiology*. He has received the President's Award for Excellent Performance in Research and Scholarly Activities (2003/2004).

The Croucher Senior Research Fellowships scheme was first introduced in the 1997/98 academic year to recognize local academics excelling in scientific research work. Funds are awarded to the universities of the fellowship recipients, enabling them to recruit replacement teachers to take over the award winners' duties for the period of the fellowships.

Prof. Chung demonstrates the use of the non-invasive blood glucose meter.

Non-Invasive Blood Glucose Meter

According to the World Health Organization, about 180 million people around the globe are diabetics and the figure is expected to double by 2030. Many diabetics regularly check their blood glucose levels by collecting blood samples through syringes or finger-pricking.

To minimize the discomfort experienced by diabetics while testing their blood glucose levels, Prof. Thomas Wong, Vice President (Management), and Prof. Joanne Chung, School of Nursing, developed the "Non-Invasive Blood Glucose Meter" last year using near-infrared technology, and the US patent of which was secured by PolyU.

The meter does not cause any wound, pain or discomfort to users and its measurements are about 80 percent accurate and comparable to results from a blood test. The meter can be adjusted to monitor other blood substrates, such as cholesterol and lactic acid.

The meter was awarded a Gold Medal with Jury's Commendation at the 35th International Exhibition of Inventions, New Techniques and Products held in Geneva as well as a Bronze Medal at the 54th World Exhibition of Innovation, Research and New Technology held in Brussels.

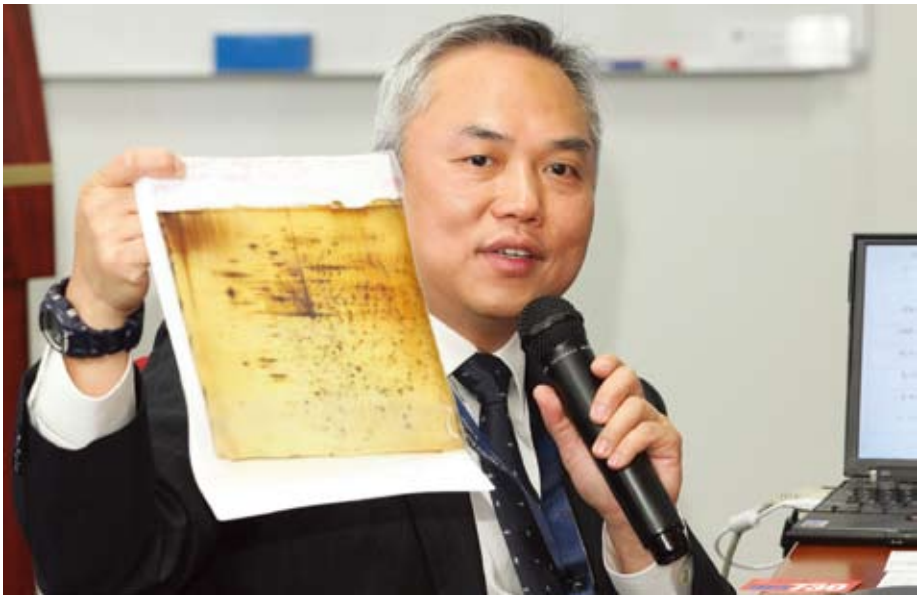
CareLife to Popularize the Meter

This new invention also gave rise to the formation of a new company, CareLife HealthCare (CareLife), by a local medical equipment manufacturer to commercialize the meter.

On 4 March, PolyU received a HK$30 million grant from CareLife to support further research and development of the meter and make it more compact.

Witnessed by PolyU President Prof. Timothy W. Tong and Deputy President Mr Alexander Tzang, the agreement was signed by CareLife CEO Mr Eric Lee and PolyU Vice President (Partnership Development) Dr Lui Sun-wing.

This is yet another example of PolyU's commitment to pursue research for the benefit of mankind.



Prof. Lo's research reveals that the marine oil extract can decrease the synthesis of some proteins associated with inflammation.

Research Reveals Anti-Inflammatory Mechanism of Marine Oil

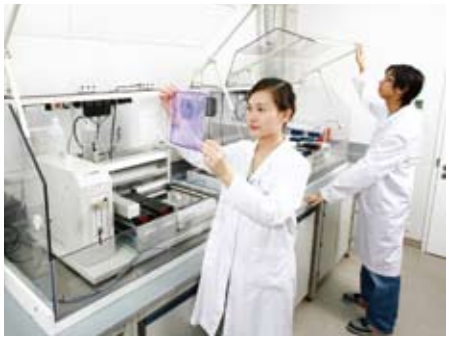
A research team led by Prof. Samuel Lo Chun-lap of the Department of Applied Biology and Chemical Technology has uncovered a previously unknown anti-inflammatory mechanism for soothing arthritic pain. This pioneering work is likely to lead to further research on the relationship between functional foods and this crippling disease.

Intrigued by whether food supplements would alleviate the symptoms of arthritis, the research team started with testing oil of ***Perna canaliculus***, the green-lipped mussel of New Zealand, on rats with adjuvant-induced arthritis in PolyU's Proteomics Laboratory.

Studies have revealed that the oil extract is capable of relieving pain in the animals; modulating cytokines with a decrease in cytokines associated with inflammation, and leading to an increase in IL-10 (a cytokine that controls inflammation).

Proteomic studies showed that the oil extract decreased the synthesis of some proteins associated with inflammation and increased the synthesis of the anti-inflammatory enzyme MDH. This discovery has cast new light on the anti-inflammatory function of this kind of marine oil and its underlying mechanism of soothing arthritis.

The findings of this ground-breaking study were published in the ***Inflammopharmacology*** journal in 2008 titled "Differential protein expression induced by a lipid extract of ***Perna canaliculus*** in splenocytes of rats with adjuvant-induced arthritis".



Two sets of robotic systems enabled Prof. Lo's research on arthritis to have high throughput. Important proteins crucial to the control of inflammation in arthritis can be identified easily.

Two sets of MALDI-TOF mass spectrometers are used to identify important proteins that are crucial to control arthritic inflammation.

More Studies in the Pipeline

The oil of ***Perna canaliculus***, when extracted supercritically, is free of protein and carbohydrate. A large number of studies have been published on its composition, complex mode of action, activity in animal models, and efficacy in controlling osteoarthritis and moderating asthma in patients.

In the next stage, PolyU researchers will look into the anti-inflammatory functions of other common foods as well as Chinese herbs. Prof. Lo will also be working with Dr Mason Leung, Associate Professor, Department of Rehabilitation Sciences, and involving athletes and sportsmen besieged by arthritis to do the research. These studies are supported in part by an unrestricted grant for education and research from Pharmalink International Ltd.

PolyU Inventions Win Ten Awards in International Expos

In the 6th International Exhibition of Invention held in Suzhou, China, and the 60th International Trade Fair "Ideas – Inventions – New Products" (IENA) held in Nuremberg, Germany, PolyU researchers scooped altogether 10 awards, including four Gold, three Silver and two Bronze Medals and a Special Prize.

6th International Exhibition of Invention

Gold Medal and Special Prize:

Eco-blocks
By Prof. Poon Chi-sun, Department of Civil and Structural Engineering
(Please refer to P. 11)

Gold Medal:

FabricEyeTM - Fabric Structure Analysis and Appearance Evaluation System
By Prof. George Baciu, Associate Head, Department of Computing; Prof. Hu Jinlian, Institute of Textiles and Clothing

Developed by inter-disciplinary PolyU researchers using high-resolution cameras, FabricEyeTM is a fabric analysis system which scans and captures the surface images of fabric samples. With the system's automatic analysis function, the fabric will be graded on a five-point scale, in accordance with the international ASTM (American Society for Testing and Materials) or other equivalent standards.

The captured images facilitate industry practitioners' building up their own database for further fabric analysis and production improvement. The latest model of FabricEyeTM has added two new modules replacing traditional manually-performed functions – one for fabric analysis of weave structure and the other for the appearance evaluation

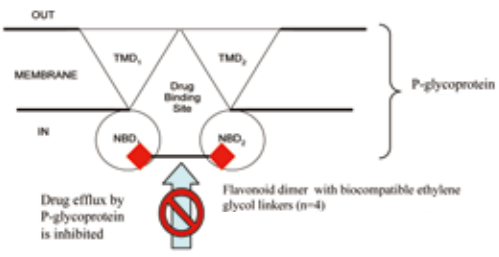
of knitwear, which help raise industry standards in quality assessment of fabric materials.

Supported by a $2.5 million grant from the HKSAR Government's Innovation and Technology Fund, this research project was conducted in collaboration with the Hong Kong Research Institute of Textiles and Apparel.

Silver Medal:

Design, Synthesis and Characterization of Flavonoid Dimer in Reversing Drug Resistance in Cancer
By Prof. Chan Tak-hang and Dr Larry Chow Ming-cheung, Associate Head, Department of Applied Biology and Chemical Technology

Multi-drug resistance (MDR) mediated by P-glycoprotein (P-gp) is a major problem of cancer chemotherapy. Chemotherapy treatments for cancer patients fail because these proteins transport the drug out of the cells and render them ineffective. A promising family of MDR modulators is the flavonoids for they are commonly found in daily diets and have relatively low toxicity. PolyU researchers have synthesized a series of novel flavonoid dimers and demonstrated that they can reverse MDR in human cancer cells in vitro. They have further improved the efficacy of these MDR modulators by changing their chemical structures. Several compounds now have an efficacy comparable to those of the most potent MDR reversing agents used in clinical trials.

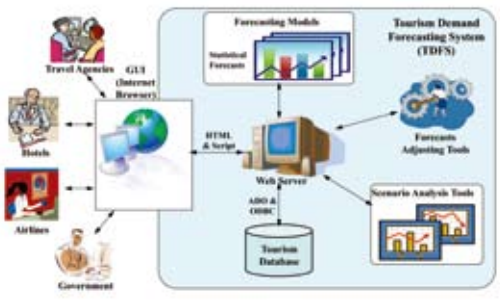


Flavonoid dimmer reverses taxol resistance of breast cancer cells.

Silver Medal:

Intelligent Tourism Demand Forecasting System
By Prof. Song Haiyan, Associate Director, School of Hotel and Tourism Management

Jointly developed by PolyU's Public Policy Research Institute and the School of Hotel and Tourism Management, this web-based system can forecast tourism-related demands in terms of tourist arrival, expenditure by sectors and hotel room nights. The forecast figures are available for 10 major source countries and regions, including Australia, China, Japan, Korea, Macao, the Philippines, Singapore, Taiwan, the UK and the USA. Not only does the system forecasts incoming tourists, it also predicts the number of outgoing Hong Kong residents and their preference for tourist destinations in the next decade, thus providing useful figures for practitioners to project future industry demand. This system also allows industry personnels to generate different scenario analysis by inputting their own estimation of economic growth rate and fluctuation in currency exchange rates.



The design of the Intelligent Tourism Demand Forecasting System

With the new prototyping technology, complex building structures can be shown clearly when viewing with 3D glasses.

Bronze Medal:

A Design-Build Optimization Platform for the Construction Industry
By Prof. Li Heng, Department of Building and Real Estates

This simulation system is capable of turning two-dimensional construction technical drawings into vivid three-dimensional images of skyscrapers and complex building structures with details of nuts and bolts. Powered by the ability to mimic every step of the construction process through visualizing the workflow and the logistics arrangement, this virtual technology facilitates scenario planning for mammoth projects, thus enabling property developers and project managers to achieve better cost-saving and avoid unnecessary delays.

This construction platform has been adopted by major construction contractors such as Gammon Construction Ltd and China Overseas Holdings Ltd, and has been used in the planning of many complex construction projects including the Island East Commercial Building in Quarry Bay, Tseung Kwan O Sports Stadium (the venue for East Asian Games), and the Venetian Hotel in Macao.

60th International Trade Fair "Ideas – Inventions – New Products" (IENA)

Thin film pad from PHAs

Gold Medal:

Production of Bio-Degradable Plastics from Activated Sludge
By Prof. Chua Hong, Department of Civil and Structural Engineering

Environmental research found that the chemical polyhydroxyalkanoates (PHAs), with its bio-degradability, bio-compatibility and suitable mechanical properties, is a viable option to substitute and a green alternative for the petroleum-derived plastics. Given that large-scale commercialization of PHAs is costly in terms of production and raw material, Dr Chua and his team have been investigating the possibility of using industrial wastes as the carbon source for economical production of PHAs.

Knowing that micro-organisms in active sludge can accumulate PHAs as the intermediate metabolic products from the uptake of organic matters in sewage, the research team studied the wastewater treatment process together with PHAs production and found that after extracting the PHAs polymer, the quantity of active sludge disposed from the wastewater treatment process could be reduced and in turn, the cost of activated sludge treatment and production of PHAs could be lowered. Subsequently, a pilot study in a dyeing wastewater treatment plant in Guangzhou has shed light on the optimal operating condition for the production of PHAs from activated sludge.

Gold Medal:

Heart Rate Variability Pervasive and Interactive Audio-Visual (AV) Relaxation System
By Prof. Joanne Chung, School of Nursing

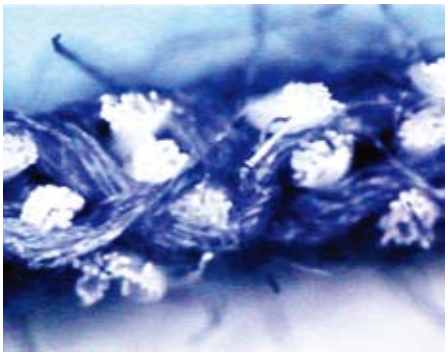
A combination of pleasant audio and visual stimulation is helpful to relaxation. This handy cyber-looking gadget can show images of gorgeous landscapes, play soothing songs or music, and measure heart rate variation at the same time. To help users practise effective relaxation, this product is installed with a real time display of Heart Rate Variability (HRV) analysis which indicates the stress level experienced by the user, referring to the extent of heart rate fluctuation and the modulation of cardiac function by the autonomic nervous system and other physiological regulation systems.
This product is non-invasive, pervasive, interactive as well as expandable and can be used any time, anywhere. Its built-in memory is capable of storing users' customized treatment results, which can be further stored and analysed in a computer for other purposes.

Silver Medal:

Plant Structured Textile Fabric
By Prof. Fan Jintu, Institute of Textiles and Clothing

Prof. Fan's invention in textile fabrics mimics the water transport mechanism of plants with their excellent branching network, resulting in a minimum flow resistance between the root and the leaves. This network creates a "cohesion-tension mechanism" and imposes negative water pressure on the leaves to suck the water from below.

The innovative plant-structured fabric has distinct features and advantages including: superior water absorption rate; excellent moisture management property; superior water transport property that does not deteriorate after repeated laundering; environmental friendliness as little chemicals are used in the finishing.



Bronze Medal:

Smart Therapy
By Prof. Samuel Lo Chun-lap, Department of Applied Biology and Chemical Technology; Dr Mason Leung Chin-pang; Associate Prof., Department of Rehabilitation Sciences

The commonly-used method of Transcutaneous Electrical Nerve Stimulation (TENS) for treating pains, such as arthritis joints, has no sensing capability for pain indication. An inter-disciplinary research team at PolyU, comprising experts from the Department of Applied Biology and Chemical Technology, Rehabilitation Sciences, Health Technology and Informatics, Electrical Engineering, Research Institute of Innovative Products and Technologies, and the School of Design, developed this new device to monitor changes of skin temperature, an indication of pain levels (established through clinical trails), and then trigger electrical stimulation for pain relief.

According to the result of an animal study, it has been proven that optimal electrical stimulation will generate 40 percent more pain-relieving Beta-endorphin in the brain than conventional TENS devices. Using this device, the skin temperature profile can be monitored at real-time to indicate the effectiveness of the treatment, allowing patients or physiotherapists to select optimal therapies. The therapeutic data can also be transferred for off-line analysis.