

Striking gold in Geneva

Home-grown innovations shine in world inventions expo



Dr Lui Sun-wing, Vice President (Partnership Development) (centre), poses with the key researchers of the award-winning projects.

PolyU innovations have won top awards in the International Exhibition of Inventions, New Techniques and Products, held from 18 to 22 April in Geneva.

These awards included four Gold Medals, one of which received special congratulations from the Jury, two Silvers, one Bronze and two Special Prizes — making the largest number of awards scored by PolyU since the University first participated in the event.

Under the patronage of the Swiss Federal Government and the City Government of Geneva, the exhibition has put together some 1,000 inventions and 775 exhibitors from 45 countries, drawing more than 75,000 visitors from all over the world. The winning projects are listed on the following pages.

Showcasing Innovation & Technology



Mr Ho (centre), Prof. Poon (third from right), Deputy President Mr Alexander Tzang (third from left), Dr Lui (second from right) and industry representatives kick-off the opening ceremony of the Showcase.

To share its award-winning and outstanding research achievements with the public, PolyU recently staged its 70th Anniversary Innovation & Technology Showcase on and off campus for about two weeks. The event was opened at PolyU on 29 May by Mr Francis Ho Suen-wai, Permanent Secretary for Commerce, Industry and Technology (Communications & Technology), HKSAR Government. According to Prof. Poon Chung-kwong, PolyU President, ever since the University started to participate in invention expos worldwide in 2001, PolyU researchers have reaped more than 70 major awards with their innovative research. ❖



Mr Andrew Young, Head of Partnership Development Office, is introducing the inventions to Mr Ho (right).



From right: Prof. Chung, Prof. Wong and research team members.

Gold Medal with the Jury's Congratulations:

Non-invasive Blood Glucose Meter

By Prof. Thomas Wong Kwok-shing, Faculty of Health and Social Sciences

Using near-infrared technology, PolyU researchers have developed a novel method to monitor the blood glucose level of human subjects. Unlike the traditional method of collecting blood samples through syringes, this new method is non-invasive and will not cause any pain or discomfort. The new device works on the mechanism of identifying and reducing the number of essential wavelengths required. This can help reduce the size and cost of corresponding hardware device and facilitate portable and continuous monitoring of blood glucose level.

This method is ideal for frequent use by diabetic patients. Its use can be further extended to monitor other blood substrates such as cholesterol and lactic acid. Led by Prof. Wong, the team includes Prof. Joanne Chung and Dr Fan Ka-lun from the School of Nursing.



Dr Li (front) and technical team member Mr Fan Chi-ho.

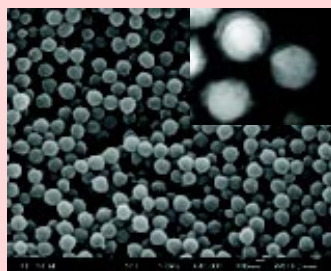
Special Prize and Gold Medal:

Smart Core-Shell Nanosorbents for Wastewater Treatment

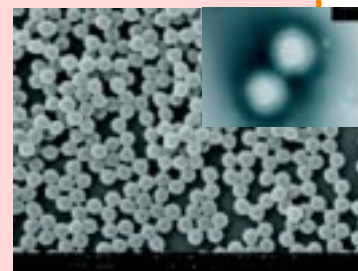
By Dr Pauline Pei Li, Department of Applied Biology and Chemical Technology

Dr Li has developed a new type of polymer particles which pave the way for a new environmental nanotechnology for water pollution control. These particles have well-defined hydrophobic cores and functional hydrophilic shells. The sizes of these core-shell particles are in the range of nano- to submicro-scale. The functional shells of the particles can effectively absorb most of recalcitrant organic and inorganic contaminants which are often found in landfill leachate and industrial wastewater. The absorbed particles containing the contaminants can be separated by using a simple ultra-filtration system, and then easily regenerated for repeated uses without affecting their absorption capacity and performance.

Compared to other low-cost adsorbents such as granular activated carbon (GAC), the core-shell nanoparticles have many benefits, including large surface area and high reactivity for efficient absorption, short treatment time and ease of operation, good dispersion and rapid diffusion in water, recyclability, and anti-virus and bacterial properties.



PMMA/PEI core-shell nanoparticles



PMMA/chitosan core-shell nanoparticles

Special Prize and Gold Medal: A Smart Dressing System for advising mix-and-match styles to customers

By Dr Calvin Wong Wai-keung, Dr Sunney Leung Yung-sun and Dr Tracy Mok Pik-yin, *Institute of Textiles and Clothing*

This innovative smart dressing system offers real-time mix-and-match style advice to customers when they view their selected fashion items in front of a dressing mirror or try them on inside a fitting room. It can also customize recommendations using specially developed programmes, including a virtual try-on simulator to fit the product image onto the body figure of the customer, an intelligent fashion mix-and-match engine for emulating fashion designers in mixing and matching fashion items, and an intelligent VIP engine for customizing mix-and-match suggestions to an individual VIP based on his/her previous purchases.

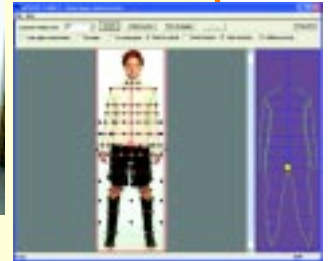
The system, enabled by Radio Frequency Identification (RFID) technology, has strong potential to help fashion retailers improve their overall services and link up with backend operations. It is currently used by a large fashion retailer and being phased in for installation at its various retail outlets in Hong Kong. It is envisaged to help fashion retailers boost their business volumes by improving sales and customer services.



From right: Dr Leung, Dr Mok and Dr Wing



Smart Dressing Mirror



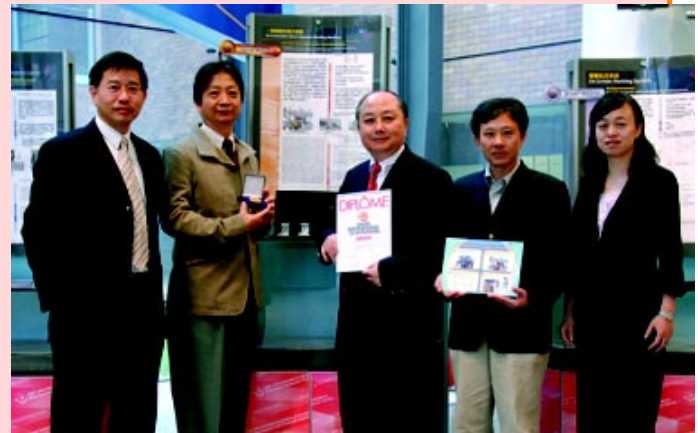
Virtual Try-on Simulator

Gold Medal: An Innovative Micro Injection Moulding Machine

By Prof. Yung Kai-leung, *Department of Industrial and Systems Engineering*

This is the world's first bottom-up high precision plastic micro-injection moulding machine which can be used in the miniaturization of products and producing high precision micro plastic parts such as micro bio-mechanisms, micro-pumps, micro nozzle, medical parts, micro lenses and optical connectors. Plastic micro-injection moulding is the most cost-effective method of making high accuracy micro-features.

While other machines only attempt to reduce the size of conventional designs, the PolyU-designed machine adopts a revolutionary upward injection design to eliminate the air entrapment problem and the need for shut-off valves that restricts melt flow. There are four servos each at the four corners of the mould clamping to automatically adjust clamping pressure for minimum mould distortion. Two linear motors are used to propel the plastic into the mould, giving unmatched acceleration and precision well below milligram level. The precision is further enhanced by real-time pressure signature analysis to prevent any variations. The mechanical design is simple with mechatronic control for future performance optimization through software upgrades. This state-of-the-art technology was developed by PolyU's Microsystems Technology Centre, established in 2005 with funding from the Government's Innovation and Technology Fund.



From right: Dr To, Dr C Y Chan, Prof. Yung, Dr K H Lau and Prof. H C Man.



Upward injection and valveless design

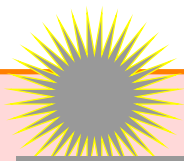
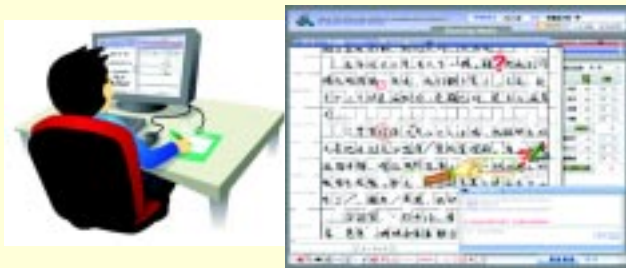


Prof. Stephen Mak

Silver Medal: On-Screen Marking System

By Prof. Stephen Mak, Department of Building and Real Estate

In this system, examination papers are scanned and displayed on screen for marking. Pen-based mark-ups, stamps and other marking notations for different subjects are available to facilitate the marking process, and marks are recorded automatically. The system allows teachers to mark examination papers, projects or assignments on a personal computer in stand-alone mode. This system is suitable for use by individual teachers in both small- and large-sized schools as well as universities.



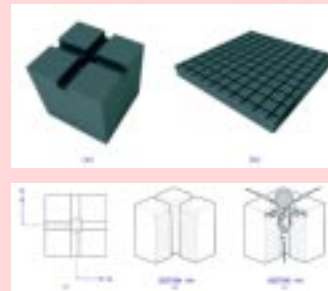
Silver Medal: Clogfree Filter

By Dr Michael Siu Kin-wai, School of Design

A common problem with filters is that the inlets of their filtration passages are often clogged by various substances during the filtration process. To enhance the filtration process, this invention minimizes clogging by adding canals to each inlet of the filtration passage so that unwanted substances will be blocked, while allowing finer fluids and substances to pass through. This creative concept is a breakthrough in designing filtration passage inlets, and it can be applied to most types of filters and filtration systems, in particular water filter systems. Since 2005, in collaboration with MIT, Stanford University, World Bank, Environment and Public Health Organization, Japan Red Cross Society, Nepal Red Cross Society, US Peace Corps, and other international institutes and NGOs, the researcher has applied the "Clogfree" concept in the design of the Kanchan™ Arsenic Filter (KAF) for removing contaminants, in particular arsenic, in drinking water. The invention is planned to be implemented in the KAF, which will be delivered to the rural communities in third world countries such as Nepal, Cambodia and Bangladesh.



Dr Siu



Bronze Medal: Personalized Ventilation Device Integrated with Seats

By Dr Niu Jianlei, Department of Building Services Engineering

In air conditioned spaces, ventilation air is usually distributed via overhead high-velocity air diffusers and nozzles. Most of the existing air-supply devices are ineffective in reducing the risks of airborne infectious disease transmission from person to person and indoor occupant and air traveller's exposure to air pollutants, as evident in the SARS outbreak in 2003. The new air supply device developed by Dr Niu consists of a flexible air supply nozzle integrated with an individual seat, adjustable to suit the user's body position. The inhaled air will be 80 per cent less polluted than the surrounding air, thus reducing the respiratory intake of air pollutant and the risk of catching airborne infectious diseases. The device can be applied for seats in settings such as auditoriums, cinemas, aircrafts, trains and buses.



Dr Niu (right) and team member Dr Gao Naiping