RESEARCH & DEVELOPMENT
研究與發展

# Pushing Frontiers of Knowledge
# 開拓知識領域

PolyU researchers have been pushing the boundaries of sustainable development with innovative breakthroughs that are changing our world for the better.
理大科研人員一直尋求突破創新，推動社會的可持續發展，成就更美好的世界。

# FUNDING FOR RESEARCH
# 科研經費

In addition to receiving funds allocated by the University, academics applied for funding from external sources, either through competitive or non-competitive means, for their research projects in 2013/14. Total funding during the year amounted to HK$1,541 million in support of over 2,700 projects undertaken by more than 1,000 academic staff and around 1,000 research personnel.

除了大學提供的科研經費，教學人員同時積極透過競爭或非競爭渠道，申請校外不同種類的科研基金，以資助他們的科研項目。2013/14年度，理大科研計劃的總資金為十五億四千一百萬，資助超過二千七百項科研計劃，而參與其中的教學人員有一千多名，科研人員約一千名。

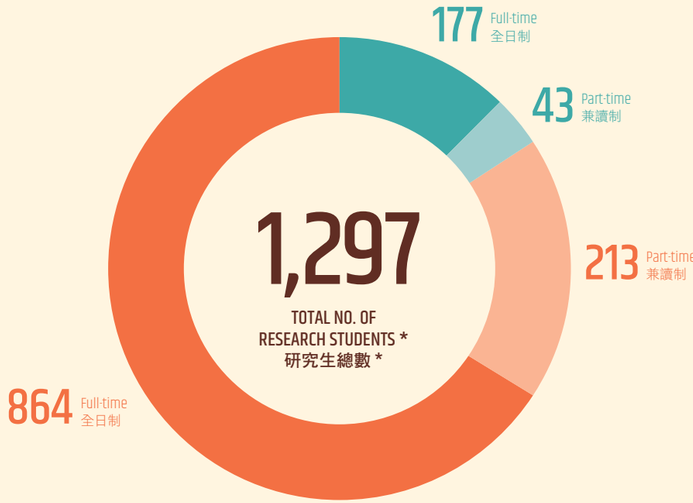
## Newly-funded projects in 2013/14
## 2013/14 年度新科研計劃

| FUNDING SOURCE<br>資金來源 | NO. OF PROJECTS<br>計劃數目 | AMOUNT IN TOTAL (HK$m)<br>資助總額 (百萬港元計) |
|---|---|---|
| Research Grants Council<br>研究資助局 | 177 | $117.35 |
| Innovation and Technology Fund<br>創新及科技基金 | 58 | $173.72 |
| Other competitive grants<br>其他透過競爭渠道獲取的科研經費 | 69 | $35.91 |
| China fund #<br>中國境內科研基金 # | 69 | $39.98 |
| Non-competitive grants *<br>非競爭性資助 * | 433 | $117.90 |
| **總數<br>TOTAL** | **806** | **$484.86** |

# The amount is calculated at an exchange rate of RMB1.2515: HKD1 跟據1.2515 人民幣: 1港元的匯率計算
* Including industrial/commercial support and donations 包括工商機構贊助及捐贈

## Number of research students
## 研究生人數

As of 30 June 2014, a total of 1,297 research degree students were engaged in the following courses of study:
截至2014年6月30日，共有一千二百九十七名學生修讀以下研究課程：




1,041 Full-time Research Students 全日制研究生

256 Part-time Research Students 兼讀制研究生

1,077 PhD 哲學博士學生

220 MPhil 哲學碩士學生

A total of 258 research students graduated in 2013/14, of whom 206 were PhD graduates and 52 MPhil graduates.
2013/14 年度共有二百五十八名研究生畢業，當中二百零六名是哲學博士學生，五十二名是哲學碩士學生。

* including deferred students
包括休學生

1

University Cleanroom
大學超淨室

## Launch of new state-of-the-art research facilities

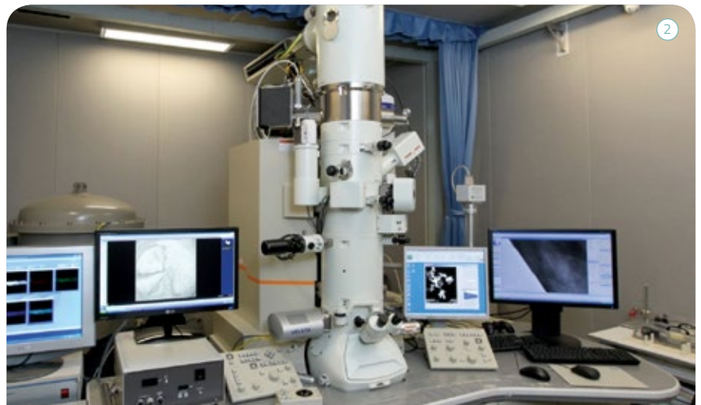
During the year, PolyU set up the first University Research Facility - University Research Facility in Materials Characterization and Device Fabrication (UMF) as part of the University's strategic plan to achieve world-class research standard. UMF comprises a state-of-the-art suite of laboratories that includes the existing Materials Research Centre, Centre for Electron Microscopy and the Central Fiber Tower. A new cleanroom has also been completed in which equipment dedicated to the design, development and testing of new materials will be installed.

Supported by CMF, the University is now in a position to overcome challenges in materials research with the aim of providing leadership in the materials community. This facility will be a catalyst for multidisciplinary education and innovation by coordinating materials-related activities, maintaining core and shared facilities, training students and fostering collegial exchanges of expertise. It will have a diverse range of sophisticated equipment for materials synthesis, characterization and processing, including a high-resolution field emission transmission electron microscope capable of resolving atomic structures down to sub-nanometer scale.

## 增設尖端科研儀器

年內，理大開設第一個中心實驗室 — 材料與器件中心實驗室。這是大學策略發展計劃的一部分，有助理大達致世界級研究水平。該中心擁有最先進的實驗室，包括現有的材料研究中心、電子顯微鏡中心和中央光纖塔。此外，新的大學超淨室亦已落成，將配備一系列適用於新材料設計、開發和測試的儀器設備。

該設施中心將可支援理大面對材料研究方面的挑戰，從而在這個範疇達致領先地位。通過組織材料研究相關的活動、維護核心共用設施、培育學生和促進院校間的專業交流，設施中心將促進多學科教育和創新科研，並具備多種精密儀器，可用於材料合成、表徵和加工設備，包括高分辨率場發射透射電子顯微鏡，能夠解析亞納米級別的原子結構。



2

High-resolution Field Emission Transmission Electron Microscope located in the Centre for Electron Microscopy
位於電子顯微中心內的高分辨場發射透射電子顯微鏡



# FOSTERING NEW PERSPECTIVES IN NICHE AREAS
# 發展專長領域

## Developing novel space tools

PolyU has been continuously expanding its space engineering technologies on several fronts. Recent successes include the Chinese soft landing of Chang'e-3 on 14 December 2013, in which PolyU designed and built a Camera Pointing System for capturing images of the moon's surface. Jointly developed by PolyU researchers and the China Academy of Space Technology, it is the first Hong Kong-designed and -manufactured instrument to operate successfully on a celestial body. A lightweight motorized device, it enables vertical and sideways movements of the camera for capturing images of the moon and movement of the rover known as Yutu (Jade Rabbit). All pictures sent back from the moon were taken with the support of this device.

Also contributing to the success of the project was Dr Wu Bo of the Department of Land Surveying and Geo-Informatics, whose lunar mapping techniques have been used in the topographical analysis and landing site selection of Chang'e-3.

## 研發創新太空儀器

理大正循多個方向發展太空工程技術，近期成功例子包括於2013年12月14日於月面軟着陸的嫦娥三號。其中理大與中國空間技術研究院合力研發的相機指向機構系統是首個香港自行設計及製造，並能成功於外太空運作的儀器。此系統由馬達驅動，體型輕巧，能俯仰及偏航轉動，拍攝月貌全景及監視「玉兔號」月球車。所有從月球傳送返地球的圖片都是在這系統的支援下拍攝的。

另外，土地測量及地理資訊學系吳波博士亦為登月項目作出貢獻。他研發的月球測繪技術，為嫦娥三號就著陸區進行地形地貌的分析工作及選取著陸點。

3

Camera Pointing System
相機指向機構系統

4

Panorama image of moon captured by the Camera Pointing System
相機指向機構系統拍攝的月貌全景圖

5

Photo of the rover captured by the Camera Pointing System
相機指向機構系統拍攝的月球車相片

The PolyU research team has also been invited to develop the Surface Sampling and Packing System for the third phase of China's Lunar Exploration Programme to be launched in 2017. The team is led by Prof. Yung Kai-leung of the Department of Industrial and Systems Engineering and with the support of Ir Dr Robert W. M. Tam and his teammates at the Industrial Centre, who will participate in the mission of bringing lunar regolith (loose rock and dust above a layer of bedrock) back to earth.

理大研究團隊更獲邀在國家探月工程第三階段，研發一具「表取採樣執行裝置原理樣機」，用以採集月壤及封裝帶回地球。團隊由工業及系統工程學系容啓亮教授帶領，成員包括工業中心譚惠民博士、工程師及其他工業中心成員。

Experienced in international space exploration, the PolyU team has developed many flight-qualified space instruments over the years, such as the Mars Rock Corer for the European Space Agency's Mars Express Mission in June 2003. Also developed by the PolyU team was the Soil Preparation System (SOPSYS), which carried the lander of the Sino-Russian Phobos-Grunt mission in November 2011. SOPSYS was responsible for in-situ analysis of Phobos rocks. Some of the technologies developed for SOPSYS were applied in the Camera Pointing System used in the successful Chang'e-3 lunar mission.

理大團隊具備探索太空的國際經驗，多年來研製出多個航天儀器，包括於2003年6月參與歐洲太空總署探索火星任務的「岩心取樣器」，以及在2011年11月參與中俄合作的「火衛一・土壤」火星任務的「行星表土準備系統」，用以實地分析泥土樣本。系統中的技術更被應用到「相機指向機構系統」中，並成功隨嫦娥三號登月。

At the 42nd International Exhibition of Inventions in Geneva held in April 2014, SOPSYS was awarded the Grand Prize and Gold Medal with Jury's Commendation.

在2014年4月於日內瓦舉行的第四十二屆國際發明展上，「行星表土準備系統」獲頒特別大獎及評判特別嘉許金獎。

## Enhancing container flow management

## 優化集裝箱運輸管理

6

Containers stored at the Kwai Tsing Container Terminals
存放在葵青碼頭的集裝箱

Using novel optimization and econometric models, this project evaluated and improved container flow management, thus recommended improvement strategies for the Port of Hong Kong to further enhance its competitiveness.

此項目運用新穎的經濟學和數學模型來分析和優化集裝箱運輸管理，為進一步提升香港港口的競爭力，提出了改善策略。




# MEETING THE CHALLENGES OF URBAN SUSTAINABILITY
# 迎接可持續城市發展的挑戰

The Research Institute for Sustainable Urban Development (RISUD) was established in 2012 to develop innovative solutions for sustainable high-density cities by capitalizing on the living laboratory of Hong Kong's dense urban environment and PolyU's multidisciplinary expertise.

理大於2012年創立可持續城市發展研究院（研究院），旨在借鑑香港作為高密度都市的切身經驗，薈萃跨學科的科研專才，以創新研究促進高密度城市的可持續發展。

During the year, RISUD was expanded to include a total of 31 research groups organized into five divisions: the (i) Division of Urban Systems, (ii) Division of Urban Infrastructure, (iii) Division of Urban Environment, (iv) Division of Green Buildings, and (v) Division of Smart Cities.

年內，研究院轄下的研究小組已增至三十一個，分別隸屬（一）城市系統；（二）城市基建；（三）城市環境；（四）綠色建築；以及（五）智慧城市五個分部。

To foster collaboration with government departments and industry and put research findings into practice, RISUD researchers have been commissioned to undertake a number of collaborative research projects:

為加強與政府部門及業界的合作，並善用科研成果，研究院的科研人員已開展了一系列研究項目：

1. Integrated and Sustainable Remediation of Contaminated Land in the Lok Ma Chau Loop and North East New Territories New Development Areas funded by the Civil Engineering and Development Department.
2. Life-cycle Commissioning and Optimization of The Cooling and Ventilation System of To Kwa Wan Underground Station funded by MTR Corporation.
3. Enhancing Building Environmental Quality by a Novel Ventilation Shaft and a Ventilation-enabled Noise Barrier with On-site Validation funded by the Hong Kong Housing Authority.
4. Renewable Energy Applications in Public Housing Development funded by the Hong Kong Housing Authority.
5. Development of an Energy Efficient Optimal Control Software Package funded by Yau Lee Company Ltd.
6. Cooking Emission Monitoring and Assessment in Residential Kitchens funded by the Hong Kong and China Gas Company Ltd.

1. 落馬洲河套及新界東北新發展區污染土地的綜合修復研究，獲土木工程拓展署資助。
2. 土瓜灣地底車站通風及空調系統全壽命週期校驗及優化研究，獲港鐵公司資助。
3. 利用新式通風井及可通風隔音屏障改善建築環境質素研究及實地驗證，獲香港房屋委員會資助。
4. 發展公共房屋時應用可再生能源的研究，獲香港房屋委員會資助。
5. 節能優化控制軟件項目開發研究，獲有利集團有限公司資助。
6. 家居廚房煮食廢氣的監測及評估研究，獲香港中華煤氣有限公司資助。

In addition, a major study was led by Prof. Wu Chen (leader of the Research Group for Management of Underground Utilities) on the development of a Hong Kong positioning infrastructure based on GPS, Beidou and the ground-based augmentation system. This study was funded by the Innovation and Technology Fund.

另外，由「地下管線管理研究小組」組長陳武教授領導，利用全球定位系統、北斗系統與地面增強系統研發香港定位基礎設施的大型項目，亦獲創新及科技基金撥款支持。

# CONTRIBUTIONS TO NATIONAL DEVELOPMENT
# 貢獻國家發展

In collaboration with universities and institutions in the Chinese mainland, PolyU participated in a number of research projects that have contributed to the nation's development.

理大與中國內地大學及院校一起參與多個研究項目，為國家的發展出一分力。

## Study on new drug theories

This project is one of the sub-projects of the National Basic Research 973 programme in cooperation with eight State Key Laboratory Incubation Bases in China. The project aims to investigate the pharmacodynamics and pharmacokinetic properties of the bioactive fraction of *Sambucus williamsii Hance* (a traditional folk medicine for the treatment of bone and joint diseases in China) that account for its bone protective effects. The study will provide a new theory for the safety and efficacy of new anti-osteoporosis drug treatments.

## 新藥理論研究

本項目是國家重點基礎研究發展（973）計劃專項的八個子課題之一，由八所國家重點實驗室培育基地合作進行。針對中藥接骨木（中國傳統民間用以治療骨骼和關節疾病的藥物）活性部位，開展藥效藥代動力學理論研究，以期為抗骨質疏鬆藥物的安全性和有效性提供科學依據。

7

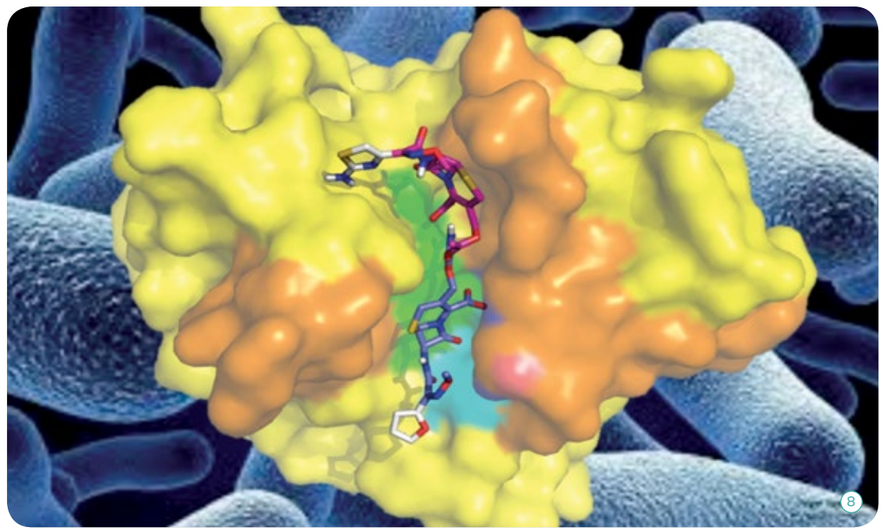
Sambucus williamsii Hance
接骨木

## An efficient way to monitor social events

In collaboration with mainland academics, PolyU researchers are leveraging crowd intelligence by utilizing mobile devices to automatically collect information, which can then be processed through spatial correlation efficiently and economically to monitor social events.

## 高效評估社會活動

理大科研人員與中國學者合作研究借助移動裝置，自動收集群體信息，通過分析空間關聯，以便捷和低成本的方式來評估社會活動。


## Control of antimicrobial resistance in animal pathogens

Led by China Agricultural University and under the 973 programme, PolyU and five mainland universities collaborated in a project, which was to investigate the transmission and control of antimicrobial resistance in animal pathogens. The findings will enhance the ability to conduct surveillance and risk assessment of antimicrobial resistance in bacterial pathogens.

## 控制畜禽病原菌耐藥性

由中國農業大學帶領，理大與五所內地大學合作的國家重點基礎研究發展（973）計劃，針對畜禽病原菌耐藥性形成、傳播與控制等問題的研究，以提升國家畜禽病原菌耐藥性檢測和風險評估。

8

Bacteria
細菌

## Novel acoustic functional materials

PolyU has been working on a project that will fabricate large-size-oriented relaxor-based ferroelectric single crystals with uniform components through innovative theoretical methods and materials preparation. In this project, advanced acoustic materials will be developed to produce high-performance ultrasonic transducers for medical imaging and non-destructive testing.

## 高性能聲功能材料

理大致力以創新理論方法和材料製備技術，研製出組分均勻取向大尺寸弛豫鐵電單晶、高效人工梯度透聲材料和高效超結構複合吸聲材料，以推動高端醫學超聲成像和無損探測系統的發展。

# ADVANCING KNOWLEDGE AND THE FRONTIERS OF TECHNOLOGY
# 推動知識創新　拓展科技前沿

9

During the year, PolyU's research initiatives continued to break new ground and contributed to technological advances that will benefit society.

年內，理大的研究項目繼續有新的突破，促進科技發展，造福社會。

9

Prof. Alexander Wai (left), PolyU Vice President (Research Development), explaining the phased development of the ASRC to Dr Greg Hyslop, Vice President and General Manager of Boeing Research and Technology.

理大副校長（科研發展）衞炳江教授（左）向波音研究與技術副總裁兼總經理 Greg Hyslop 博士介紹航空服務研究中心的階段性發展。

## Opening of Phase One of the Aviation Services Research Centre (ASRC)

ASRC Phase One opened on 13 November 2013, one year after the signing of a Memorandum of Understanding between PolyU and the Boeing Company. Phase One of this facility covers a floor area of 250 sq. m, while Phase Two will add a further 1,045 sq. m to the ASRC. The last phase is targeted for completion by the end of 2016.

Equipment such as a 5-axis machine, robots and large capacity aerospace machine tools will be set up and commissioned in the ASRC progressively during each phase.

## 航空服務研究中心第一期正式開幕

理大與波音公司於2012年簽署合作備忘錄，設立航空服務研究中心。2013年11月13日，此中心的第一期正式開幕。中心第一期佔地二百五十平方米，籌劃中的第二期佔地一千零四十五平方米，而第三期預計於2016年底建成。

中心將分階段添置各種機器和設備，例如：五軸加工設備、自動化設備、航天工業使用的大型機床等。

Since its opening, the ASRC has secured funding support from the Innovation and Technology Fund amounting to HK$19.44 million and the participation of Boeing, Hong Kong Aircraft Engineering Company Ltd and Hong Kong Aero Engine Services Ltd. The ASRC has now embarked on a number of aviation services research projects that will address the pressing needs of the maintenance, repair and overhaul (MRO) industry. The first project, Laser Projected Drilling Templates and Robotic Drilling, will design a process using a portable laser drilling template that will save manpower and streamline the workflow of replacing parts on an aircraft's outer skin.

The second project, Mechanical Refurbishment of Aviation Parts, will develop advanced methods for mechanically refurbishing aircraft parts that will greatly reduce the cost of maintenance. This will be achieved by developing a multi-axis probing technology and the world's first mechanized method to remove distortion from turbine backing ring seals. Another 10 projects are being undertaken or considered.

航空服務研究中心成立以來，獲得創新及科技基金達一千九百四十四萬港元的資助，以及波音公司、香港飛機工程有限公司及香港航空發動機維修服務有限公司的積極支持。中心已開展多項航空服務研究計劃，以回應飛機維修工程行業的迫切需要。首個項目是關於雷射投影鑽孔模板與自動化機械鑽孔工序，目的是要設計一項簡易程序，助業界使用手提雷射鑽孔模板，預計可減少更換飛機外層組件的人手及工序。

另一項目是有關航空組件機械式翻新，研究翻新飛機組件的方法，利用最新科技以多軸式運作，以及全球首個自動移除渦輪封環壞件的方法，以減低維修成本。除這兩個項目之外，中心亦正進行或研究另外十個項目。

## Radiation-free scoliosis assessment

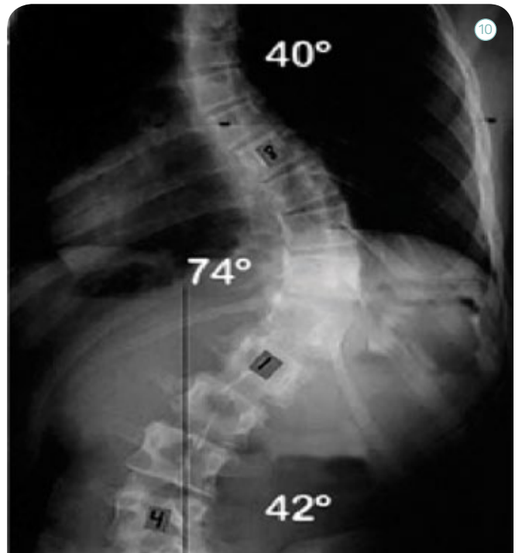
The Scolioscan is a radiation-free, low-cost measurement system for accurately screening and monitoring scoliosis of the spine. It was developed using 3D ultrasound imaging techniques, with measurement results comparable to those of conventional clinical assessments based on X-rays, but without the radiation hazard.

Scheduled for a market launch in 2015, the Scolioscan was supported by the Innovation and Technology Fund University-Industry Collaborative Programme in collaboration with Telefield International (Holdings) Ltd. This invention has received a Gold Medal and Mau Award for Best Educational Innovation at the 40th International Exhibition of Inventions in Geneva and a Silver Medal at the 62nd International Trade Fair "Ideas – Inventions – New Products" (iENA) in Nuremberg, Germany.

## 無輻射脊柱側彎測量技術

Scolioscan 是一種無輻射、低成本和精確的脊柱側彎測量系統，以檢驗和監察脊柱側彎的嚴重性。Scolioscan 是基於三維超聲技術而開發，其測量結果和基於 X 射線影像的臨床評估之間有著一致性。

Scolioscan 預期於2015年推出市場，更獲創新及科技基金的大學與產業合作計劃及中慧國際（集團）有限公司的支持。在第四十屆日內瓦國際發明展中，此創新發明榮獲金獎及最佳教育創新獎；亦在德國紐倫堡舉行的第六十二屆國際創意、發明及新產品展上獲得銀獎。




10

X-ray image of a patient with scoliosis showing spine curvature

脊柱側彎病人脊柱彎曲情況的 X 光影像

11

12

## Anti-heat stress clothing for construction workers

PolyU experts in construction health and safety, sports science, and textile technology have jointly developed a set of anti-heat protective work uniforms for construction workers using *Coolmax* and *DryInside* materials. *Coolmax* can quickly absorb sweat on the skin's surface and transmit it to the external environment, while *DryInside* makes use of nanometers of silver ions to absorb moisture and evaporate sweat. On-site field tests on the new work uniforms were conducted with over 100 frontline construction workers.

## 供建築工人抵禦高溫的工作服

理大建築健康安全、運動學及紡織技術專家利用 Coolmax 和 DryInside 布料，為建築工人開發了一套防熱應激工作制服。Coolmax 布料能迅速吸收皮膚表面的汗水及將其散發到外部環境；DryInside 布料的納米銀離子則可充分吸收水分並蒸發汗液。超過一百名建築工人已在地盤環境試穿這套嶄新的工作服。

11

Anti-heat stress uniform
防熱應激工作服

12

Construction workers perform routine duties during wear trial of the anti-heat stress uniform
建築工人試穿防熱應激工作服進行日常工作

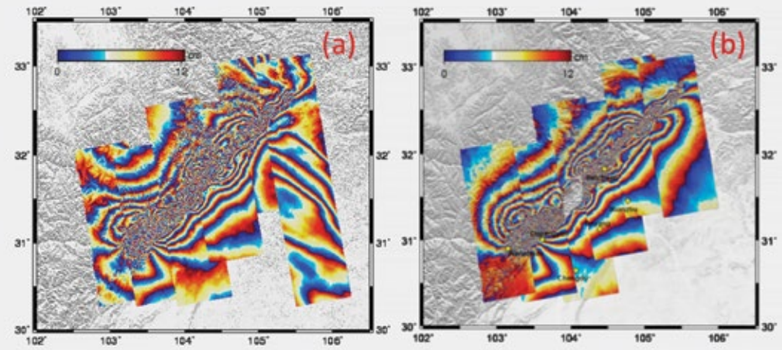
## High resolution mapping of the ionosphere

The ionosphere is the atmospheric layer that lies about 50 to over 1,000 kilometres above the Earth's surface. The amount or density of the electrons in the ionosphere has an impact on the performance of the Global Positioning System and some wireless communication systems, and is associated with natural phenomena such as earthquakes. To carry out high resolution mapping of the electrons in the ionosphere, PolyU researchers have developed techniques based on satellite radar remote sensing, in particular interferometric synthetic aperture radar (InSAR). Researchers have also mapped the high resolution ionospheric anomalies associated with an earthquake for the first time using InSAR.

## 高分辨率測量電離層

電離層是地球表面以上高度約為五十至一千公里的一個大氣層。電離層中的電子數量影響著全球定位系統和一些無線通訊系統的性能，也與地震等自然現象有關。理大科研人員研究衛星雷達遙感，特別是基於合成孔徑干涉雷達的技術，用於高分辨率確定電離層中的電子數量，更首次運用這技術，以高分辨率測量與地震相關的電離層異常情況。

13




13

Co-seismic deformation of the 2008 Wenchuan earthquake measured with satellite InSAR - (figure a) results with ionospheric effects; (figure b) results free from ionospheric effects
使用衛星合成孔徑干涉雷達測量的2008年汶川地震的同震變形 – （圖a）受電離層影響的測量結果；（圖b）未受電離層影響的結果



## Finding a remedy for pressure ulcers

A pressure ulcer is the localized breakdown of soft tissues caused by sustained, unrelieved pressure and is commonly found in frail elderly people, wheelchair users, long-term bedridden patients, and spinal cord injury patients. The University has been conducting research to examine the molecular etiologic mechanisms of muscle apoptosis machinery in the pathology of pressure ulcers. The findings will be critical to the development of effective treatments and preventive measures.

## 尋求壓迫性潰瘍療方

持續的、不可緩解的壓迫會導致局部軟組織穿透性損壞，引致壓迫性潰瘍，常見於年老體弱者、輪椅使用者、長期臥床病者和脊椎損傷患者。理大研究檢測了肌肉細胞凋亡機制在壓迫性潰瘍病理改變中的分子致病機理，結果對於研發壓迫性潰瘍的有效療方和預防措施至關重要。

14

Molecular imaging technique applied to investigate the pathological mechanisms of pressure ulcers
分子影像技術應用於壓迫性潰瘍的病理機制研究

## Optical Fiber Sensor Systems using optical communication and signal processing techniques

This project is investigating the realization of optical fibre sensor systems using optical communication and signal processing techniques. Distributed optical fibre sensors that allow the measurement of physical parameters, such as temperature and strain distribution at remote locations and in harsh environments, have found applications in many areas. Recently, researchers have studied the use of multicarrier signals and coherent detection techniques for distributed optical fibre sensor systems.

## 應用光通信及信號處理技術於光纖傳感系統中

此項目研究將光通信中的檢測及信號處理技術應用於實現光傳感系統。測量溫度及應變等物理參數的分散式光纖傳感系統，在遠距離及惡劣環境中，可應用於多個領域。最近，研究人員運用多載波及相干檢測技術，用於光纖傳感系統中。

## New statistical model for lightning location network

The Lightning Location Network (LLN) has been used worldwide to minimize lightning hazards. Researchers at PolyU have developed a new approach for computing the lightning detection efficiency (DE) of an LLN by using the lightning data recorded by the LLN itself. This new approach can provide the spatial distribution of the DE for an LLN.

## 閃電定位網的嶄新統計方法

為了減低閃電帶來的災害，閃電定位網已被全球廣泛採用。理大科研人員開發了一種新的統計學方法，利用定位網自身記錄的資料，找出定位網中單個測站的探測效率的空間分佈，並由此估算該定位網整體的探測效率。

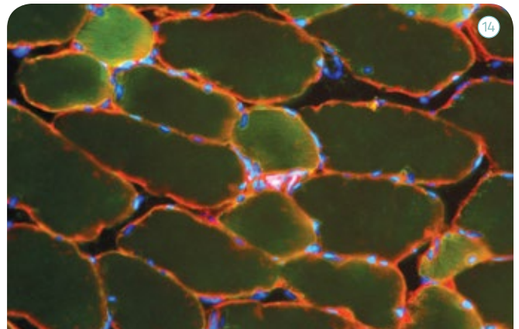
## Single-Crystal X-Ray Diffractometer as a research tool

The University will acquire an X-ray diffractometer, Bruker D8-Venture, incorporating the latest technology. X-ray crystallography is an important analytical tool in chemical research, capable of bringing to light structural information at the molecular level.

## 單晶 X-光衍射儀作分析工具

大學將添置一台先進的單晶 X-光衍射儀。晶體學是化學科研中的重要分析工具，為研究提供精準的分子結構，大大提升對分子的理解。

14



15

15

X-ray diffractometer
單晶 X-光衍射儀

16 PolyU designs an acoustic chamber for measuring tyre/road noise
理大設計的聲響間可測量輪胎/路面噪音

## Identification of low-noise tyres

Using self-designed tyre/road measuring vehicle, PolyU is engaged in a research project to identify the characteristics of low-noise tyres and low-noise road surfaces. After testing tyres with varying patterns, rubber hardness, depth and sizes, the researchers found that tyre pattern and age have a great impact on noise while tread depth and tyre size have a minor or uncertain impact. The results will help Government specify quiet tyres in designing quiet road surface.

## 鑑別低噪音輪胎

理大利用自行設計的輪胎／路面測量車，研究低噪音輪胎和低噪音路面的特點。研究人員測試不同胎紋圖式、橡膠硬度、深度和大小的輪胎後，發現輪胎紋設計和年齡對噪音有很大的影響，而胎紋深度和輪胎大小對噪音的影響則較輕微或未能確定。研究結果將有助政府在設計靜音路段時對低噪音輪胎的規定。

## Eco-flood channel design for Yuen Long nullah

This project uses an ecological assessment and physical and numerical modelling methods to develop an eco-flood channel design for concrete channels in Yuen Long. The goal is to create a near-natural and self-sustainable lotic system in order to establish and restore river corridors with rich biodiversity and meet flood control requirements.

## 元朗明渠生態河道設計

這項目利用生態評估資料、物理模型及數學模型方法，開發一個生態河道設計，為元朗多條混凝土防洪渠道進行綠化。目的是開發一個接近天然而可持續發展的河流系統，令河道沿岸回復生態，增加物種多樣性，同時又能顧及到防洪要求。

## Practising tai chi to relieve elderly insomnia

17 Tai chi training to alleviate insomnia among the elderly
太極訓練舒緩老年失眠症

PolyU is conducting a trial project to determine the efficacy of tai chi for improving chronic insomnia in older adults. This project will uncover the beneficial sleep-enhancing effects of tai chi; the findings are expected to have a significant impact by showing tai chi is an effective therapeutic alternative.

## 太極訓練舒緩老年失眠問題

理大正進行一項計劃，測試太極運動對改善老年人慢性失眠的功效。結果將揭示太極運動有幫助睡眠的良性效果，亦是一種有效解決老年失眠問題的治療性替代方案。



# Major awards for research and development projects
# 獲獎科研項目

## 42nd International Exhibition of Inventions (Geneva, Switzerland, 2-6 April 2014)
## 第四十二屆國際發明展（瑞士日內瓦, 2014年4月2-6日）

| AWARD 獎項 | PROJECT 項目 | PRINCIPAL INVESTIGATOR / FACULTY / DEPARTMENT 首席研究員 / 學院 / 學系 |
|---|---|---|
| Prize of the Legal Company "Gorodissky & Partners" - Russia<br>俄羅斯Gorodissky & Partners特別大獎<br><br>Gold Medal with Congratulations of Jury<br>評判特別嘉許金獎 | Soil Preparation System<br>(More on p.64)<br>行星表土準備系統<br>(詳見第64頁) | Prof. Yung Kai-leung, Department of Industrial and Systems Engineering<br>工業及系統工程學系容啟亮教授 |
| Special Merit Award from National Research Council of Thailand<br>泰國國家研究評議會特別獎<br><br>Gold Medal<br>金獎 | Preparation of Food Grade Capsules for Targeted Drug Delivery<br>可定向輸送藥物的食品級膠囊製備方法 | Dr Wang Yi and Dr Wong Ka-hing, Department of Applied Biology and Chemical Technology<br>應用生物及化學科技學系王奕博士及黃家興博士 |
| Special Merit Award from Romania Ministry of National Education<br>羅馬尼亞教育部特別獎<br><br>Gold Medal<br>金獎 | Multilayer Nanofiber Filter-Nanoaerosols Capture and Added Functions<br>可吸附納米氣溶膠並具備其他附加功能的多層納米纖維過濾器 | Prof. Wallace Leung Woon-fong, Department of Mechanical Engineering<br>機械工程學系梁煥方教授 |
| Gold Medal<br>金獎 | Rehabilitation Adhesive Tape Inspired by Octopus Suckers<br>微吸盤彈性黏貼織物 | Dr Guo Xia, Department of Rehabilitation Sciences<br>康復治療科學系郭霞博士 |
| Gold Medal<br>金獎 | Smart Impact Protective 3D-Spacer Fabrics of Adaptive Stiffness<br>由三維間隔織物製成的智能防衝材料 | Dr Hu Hong, Institute of Textiles and Clothing<br>紡織及製衣學系胡紅博士 |
| Special Merit Award from China Patent Information Center of SIPO<br>國家知識產權局中國專利信息中心代表團特別獎<br><br>Silver Medal<br>銀獎 | Haptic Platform for Self-Care Training in Occupational Therapy<br>為職業治療中的自理訓練而開發的觸感仿真平台 | Dr Choi Kup-sze, School of Nursing<br>護理學院蔡及時博士 |
| Silver Medal<br>銀獎 | A Novel Wearable Thermal Functional Textile with Conductive Materials<br>應用導電材料設計新型發熱功能性紡織品 | Dr Li Li, Institute of Textiles and Clothing<br>紡織及製衣學系李麗博士 |