

In this issue ...

September 2003

COVER STORY 2-7

Steering research development
to new heights
推動科研 更上層樓

SPECIAL REPORT 8-11

轉載《明報月刊》專訪校長潘宗光教授
An in-depth interview with the
President by *Ming Pao Monthly*

HEADLINE NEWS 12-17

Foresight, breakthrough:
the new Faculty of Business
PolyU invention heading to Mars

SCHOLARLY ACTIVITIES 18-21

ITF funding boosts textiles and
apparel researches

CAMPUS 22-23

STAFF 24

STUDENTS 25-29

Graduates preferred by the market

ALUMNI 30

Happy reunion at students halls

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COVER STORY

Steering research development to new heights



The University has stood out tall in this year's Competitive Earmarked Research Grant (CERG) exercise, run by the Research Grants Council (RGC). Apart from ranking first in engineering, PolyU has also been awarded a record high amount of funding. *Profile* talks to Prof. Ko Jan-ming, the new Vice President (Research Development) who is taking the driver's seat to further the University's research development.

The conversation began with the University's outstanding performance in this year's CERG. With an allocation of more than \$46.4 million, which accounted for 28.7 per cent of the discipline's total funding, PolyU has beaten other UGC-funded institutions and has come first in engineering.

The total research funding allocated to PolyU amounted to \$60.4 million – the highest ever achieved by the Institution. Of those 342 applications submitted by PolyU researchers, 125 new projects (see Table 1) were approved for CERG funding in 2003/04, and 91 were rated “fundable but not funded”.

Prof. Ko said the results were encouraging, indicating that PolyU has gained international recognition in some research areas (see Table 2).

Without being complacent, Prof. Ko believes that the University has the potentials to scale new heights. In view of this, a working group will soon be formed to draw minds together to map out the new research direction for the University.

Still new to his present position, Prof. Ko shared his vision of formulating a parallel synergy to boost the University's research development.

“For me, one plus one equals more than two,” said Prof. Ko. “This is why cross-disciplinary cooperation is so important in exploiting our research potentials to the fullest.”

Prof. Ko quoted a development project initiated by a colleague at the Department of Building Services Engineering who tried to develop a respiratory protective equipment for medical staff in isolation ward or the intensive care unit of SARS. Incorporating advice from researchers of the Civil and Structural Engineering on the application of bio-filter, he has sketched the design for the equipment. Experts from the Rapid Product Development Syndicate and Industrial Centre were then called in for detailing design and fabrication. To ensure the device is workable in the hospital environment, he sought further comments from researchers of the School of Nursing and the Department of Rehabilitation Sciences.

“The project is still under development but it is such a classic example to demonstrate the benefits of cross-disciplinary cooperation,” Prof. Ko added.



Prof. Ko Jan-ming took office as the new Vice President (Research Development) on 1 July. He is also Dean of the Faculty of Construction and Land Use.

Technology transfer is another area that Prof. Ko emphasizes on. No matter how good the research result is, the community can only benefit when a technology can be appropriately applied and commercialized. The University has long taken the lead in this area.

Successful examples are the commercialization of the Diesel Particulate Trap and the eco-bricks and blocks. Developed by the departments of

Mechanical Engineering and Civil and Structural Engineering (CSE), the Diesel Particulate Trap was launched in the market via a listed company named Eco-tek in 2000. Also developed by researchers of CSE, the technology of making eco-bricks and blocks has recently been licensed to a local construction materials supplier – K. Wah Construction Materials Ltd – for mass production and distribution (see page 15).

Despite the track records of the University in product commercialization, industrial partnership and patent registration, Prof. Ko believes closer ties should be built between researchers and members of the Institute for Enterprise (IÆ) – the well-established marketing arm of the University – for further industrial collaboration and partnership.

“While academics are good at conducting research, members at IÆ are well-trained and more sensitive to the commercial needs. I trust a new synergy can be spinned off through tighter cooperation between the two parties.

“PolyU is a dynamic institution that strives for bringing long-term benefits to society,” concluded Prof. Ko. “I believe the parallel synergy of cross-disciplinary cooperation and collaboration between academic departments and IÆ will be most effective for the future advancement of the University.”

Table 1. Summary of CERG funding approved for PolyU 2003/04

Subject disciplines	Projects supported	Amount awarded (\$'000)
Engineering	96	46,407
Physical Sciences	11	4,748
Biology & Medicine	6	4,187
Humanities, Social Sciences & Business Studies	12	5,101
Total	125	60,443

Table 2. Examples of outstanding performance in 2003/04 CERG exercise

Faculty	Department	Proposal submitted	Successful	Fundable but unfunded	Success rate
Faculty of Applied Science and Textiles	Applied Biology and Chemical Technology	26	11	5	42.31%
Faculty of Applied Science and Textiles	Institute of Textiles and Clothing	18	8	3	44.44%
Faculty of Construction and Land Use	Civil and Structural Engineering	25	12	6	48%
Faculty of Engineering	Electrical Engineering	18	8	2	44.44%
Faculty of Engineering	Electronic and Information Engineering	31	16	5	51.61%
Faculty of Engineering	Mechanical Engineering	25	15	6	60%

Projects to bear fruit

In 2002/03, PolyU has a total of 2,112 projects and the total research expenditure amounted to \$259.46 million. Ranging from construction, information engineering to fashion design, many projects have made an impact on our life.

Multimedia signal processing improves life

The Department of Electronic and Information Engineering (EIE) has submitted 31 proposals for this year's CERG and 16 have secured funding – ranking first among all PolyU departments in terms of project numbers.

Among the funded projects, eight of them are related to the Centre for Multimedia Signal Processing, focusing on video and image processing techniques.

Research findings from the Centre will have significant values on the development of multimedia data management, Internet and wireless multimedia communication for the purposes of video conferencing, image coding, remote monitoring, authentication, image and video retrieval.

Investigators:

Prof. Siu Wan-chi (also Centre Director), Prof. David Feng, Dr Chan Yui-lam, Dr Chris Y.H. Chan, Dr Zheru Chi, Dr Kenneth K.M. Lam, Dr Bonnie N.F. Law, Dr Ken K.C. Lo, and Dr Daniel P.K. Lun.

Total amount awarded (8 projects):
HK\$2.9 million



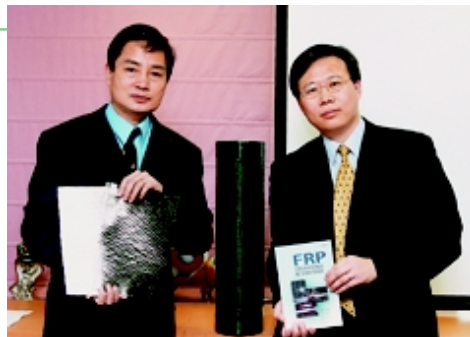
Research for advanced construction materials

A total of 12 research proposals of the Department of Civil and Structural Engineering (CSE) have been awarded CERG funding this year. One of its exciting

projects ventures into the use of fibre-reinforced polymer (FRP) composites as an advanced construction material.

Over 10 times as strong as steel yet only a quarter of its weight, FRP composites have tremendous application potentials in civil engineering, particularly in the retrofit of reinforced concrete (RC) structures. A main purpose of this CSE project is to study the shear behaviour and strength of such FRP-strengthened RC beams.

The outcome is expected to bring a breakthrough for the local construction industry as there are great retrofit needs for local RC buildings. The project will also be a significant contribution to the national research efforts in this area.



Principal Investigator:

Prof. Teng Jin-Guang, Professor, CSE, PolyU

Co-Investigators:

Prof. Ye Lie-Ping, Professor, Department of Civil Engineering, Tsinghua University
Dr. Lam Lik, Research Fellow, CSE, PolyU
Dr. Chen Jian-Fei, Lecturer, Institute for Infrastructure & Environment, University of Edinburgh

Amount awarded:
HK\$1.01 million

Intelligent fabrics to set trend for future

This year, the Institute of Textiles and Clothing (ITC) triumphed over one of its

approved projects entitled “Nano-structured Polymeric Photonics Fibers and Fabrics” for receiving the highest amount of CERG funding among other PolyU projects.

This innovative project aims to lead to the creation of novel polymeric photonic fibers and fabrics which can emit light, control colour and display moving images. It will also investigate the structural features and composites of the materials. By adopting a unified theoretical approach for the first time, the project helps advance knowledge of optical properties of fibrous structures.

Such textile displays will have tremendous application potentials for communication, transportation equipment, household furniture and decoration. These value-added products will also bring benefits to the textile and apparel industries in Hong Kong and overseas. ❖

Principal Investigator:

Prof. Tao Xiaoming, Chair Professor and Head, ITC

Co-investigator:

Dr John Xin, Associate Professor, ITC

Amount awarded:
HK\$1.07 million



Spotting star researchers

Two outstanding researchers, Prof. Albert Chan Sun-chi, Chair Professor and Head of the Department of Applied Biology and Chemical Technology (ABCT), and Prof. Ronald So Ming-cho, Chair Professor and Head of the Department of Mechanical Engineering (ME), have achieved 100 per cent success rate in their CERG applications for nine and seven consecutive years respectively. Here they share their vision on research and development.

Excellent result despite unfair playing ground

Notwithstanding his success in bidding for CERG over the past nine years, Prof. Chan did not see the track record a pure reflection of one's ability. "Many proposals of our colleagues are excellent and worth pursuing. We just don't have enough postgraduate students to help conduct the research."

This year, 11 out of 26 ABCT projects were awarded CERG and five were considered fundable but not funded. Prof. Chan said that taking into consideration of its limited resources, the Department's achievement is as good as any other institutions in the region.

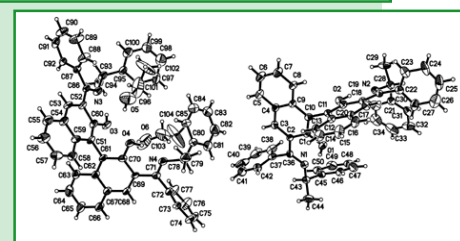
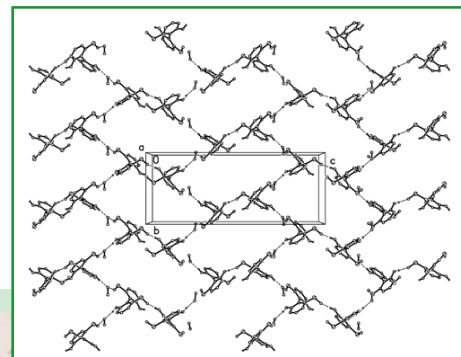
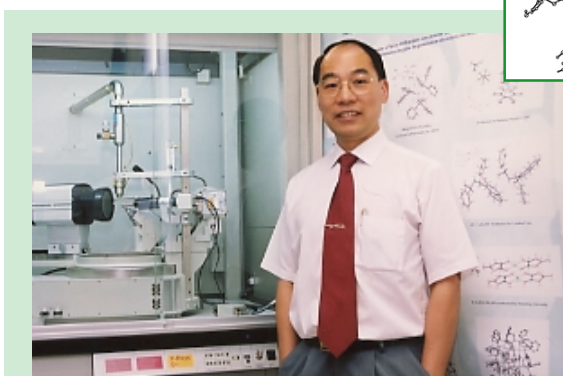
"We are competing on an unfair playing ground," stated Prof. Chan. "It is unreasonable that our number of postgraduate students is limited to about three per cent of the total student population. In most research-oriented universities around the world, that number is generally about 30 to 50 per cent.

"No good research could ever be undertaken without the support of postgraduate students. The lack of postgraduate students in universities will be a major obstacle for Hong Kong to pursue a knowledge-based economy in the years to come."

An internationally-renowned scholar in chirotechnology and chemical research, Prof. Chan's research interests lie in asymmetric syntheses, development of pharmaceutical and nutritional products based on Chinese medicines and new process sciences and their industrial applications.

"Of course there is still much room for the Department to improve but we are

proud of what we've achieved over the years," added Prof. Chan. "I sincerely thank President Prof. Poon Chung-kwong for his vision and leadership in encouraging PolyU staff to actively participate in research and development. He has provided us the right environment to grow."



Chemical crystal structures developed by Prof. Chan.

Profile of Prof. Albert Chan Sun-chi, Chair Professor and Head of the Department of Applied Biology and Chemical Technology

Prof. Chan received his PhD in Chemistry from the University of Chicago in 1979. Since then, he has pursued frontier research at the Monsanto Corporate Research Centre in the US, National Chung Hsing University and National Taiwan University in Taiwan, and HKUST. He then joined PolyU in 1994.

With the award of a Central Allocation Grant of HK\$ 4 million as seed money from the RGC in 1998, Prof. Chan has taken the lead with Prof. Che Chi-ming of HKU to establish the Institute of Molecular Technology for Drug Discovery and Synthesis – a designated Area of Excellence with an award of \$48 million research funding from the UGC.

Research brings good teaching

Getting on board PolyU in May 1996, Prof. So said the very first task assigned by the then Deputy President Prof. W.Y. Chau was to boost ME's research performance. It did not take long for him to achieve this task.

Mechanical Engineering has been spotted as one of the fastest growing departments in research development within the

University. In 1997, only five out of 14 proposals were awarded CERG funding. This year, 15 projects received funding while six were graded fundable.

According to Prof. So, the outstanding performance of ME was brought about by the changing economy of Hong Kong. "The criteria for being an engineer have changed since the '80s," said Prof. So. "With more manufacturing industries migrating north to the Pearl River Delta, the market demands a new generation of engineers who can

ride on the new economy to focus on knowledge.”

This has become a winning edge for PolyU. “With concerted efforts of our researchers, my department stands tall among our peers of other UGC-funded institutions and has made a name for PolyU in the academic arena worldwide.”

Praised for their research achievement in flow induced vibration, PolyU researchers were well respected in the recent 5th International Symposium on FSI, AE & FIV+N [Fluid-structure Interaction, Aeroelasticity, Flow-induced Vibration & Noise] held in the US. Considering the fact that there was no FIV research in the Department five years ago, this was quite an achievement.

With a passion for research, Prof. So has extensive research interests, ranging from aerospace studies to mechanical engineering. His current research interests are in flow-induced vibration,

vibroacoustics, turbulence modelling, buoyant and non-buoyant turbulent flows and turbulent heat transfer modelling.

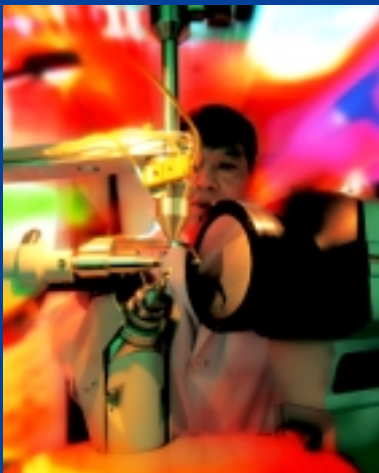
“I place a lot of emphasis on research because it underpins teaching,” said Prof. So. “Being a scientist, it is extremely

important that we keep abreast of the latest technology and research development. Only through continuous research can we forge ahead with times and develop quality teaching materials for our students. Research helps bring good teaching.”

Profile of Prof. Ronald So Ming-cho, Chair Professor and Head of the Department of Mechanical Engineering

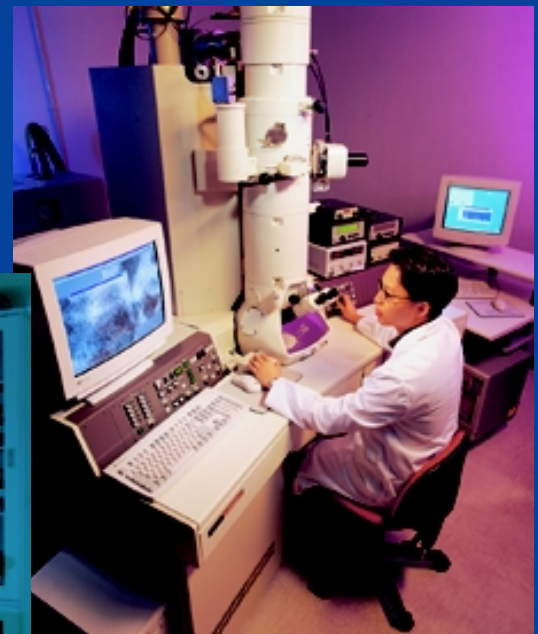
After obtaining his MA and PhD in Aerospace and Mechanical Sciences from Princeton University in 1968 and 1971, Prof. So has embarked on his research and teaching career at the Union Camp Corporation of Princeton, Rutgers University, General Electric Research and Development Center, Schenectady, New York and Arizona State University prior to joining PolyU.

Throughout the years, Prof. So has received about US\$10 million research funding from a variety of local and overseas agencies and trade, including National Science Foundation, various US departments, National Aeronautics and Space Administration, Naval Research Laboratory, and the Research Grants Council of UGC.



推動科研 更上層樓

在研究資助局（研資局）剛公佈的二零零三至零四年度角逐研究用途補助金中，理大表現卓越，除在工程學組別排名第一外，總研究資助金額更屬本校歷年最高。《步伐》專程走訪新上任的副校長（科研發展）高贊明教授。



理大在本年工程學組別中，共獲研究經費四千六百四十多萬元，佔該組別撥款總額百分之二十八點七。至於總研究資助共有六千零四十四萬三千元，屬歷年來最高資助金額；而遞交的三百四十二項申請中，有一百二十五個新項目獲撥款支持，另有九十一項獲研資局評為「值得資助但不獲資助」，整體成績可謂傲視同儕。

儘管高教授對本年的撥款成績感到滿意，但他認為理大在研究方面，仍有空間更上層樓。他認為大學主要可在兩方面加強工作，銳意發展科研的發展。

「我認為一加一多於二。」高教授解釋：「因此，我相信跨院系的合作有助推動科研工作。」

他舉例，本校一位屋宇設備工程學系研究員，於早前構思設計一套呼吸性保護設備，專為隔離病房或「非典」深切治療部工作的醫療人員而設，減少感染機會。該研究員得到土木及結構工程學系人員的協助，在設計內加入空氣過濾的功能。繪畫設計圖後，他又請得創新產品快速開發所及工業中心人員，協助製作該設備。為確保設備適用於醫院環境內，他尋求護理學院及康復治療科學系研究員的意見。

高教授說：「該設備雖仍在發展階段，但卻是最佳例子，彰顯跨院系合作的優勢。」

除跨院系合作外，高教授指出通過各學系與企業發展院合作而推動的技術轉

移，亦是大學在科研發展的另一重要策略。

理大早於多年前已率先在技術轉移下功夫，特別在產品商業化、尋求工業夥伴及專利權註冊等方面均創下良好成績。二零零零年，理大成功把土木及結構工程學系與機械工程學系攜手研製的微粒過濾器引入市場，並透過環康集團於香港創業板上市。本校最近又把土木及結構工程學系研究員研製的環保磚塊，授權本地建造材料生產商嘉華建材生產及分銷，正式把環保磚投入市場。

「理大一向強調實用性及造福社群。」高教授總結：「我相信憑著跨院系合作，以及由各學系研究員與企業發展院成員進一步配合而發揮的雙重優勢，將大大增加本校在科研方面的貢獻。」

應用科研項目 與民息息相關

在二零零二至零三年度，理大共有二千一百一十二個研究項目在進行中，總研究經費高達二億五千九百多萬元。以下簡介部份今年獲研資局資助的研究項目。

多媒體信息處理改善生活

電子及資訊工程學系今年共遞交三十一份角逐撥款申請，其中十六份成功獲得撥款，數量為理大各學系之冠。

獲批的研究項目中有八個與多媒體信息處理中心有關，焦點研究錄像及影像的處理技術。有關研究將有助發展多媒體資料管理、互聯網及無線多媒體應用等項目，可用作視像會議、影像加碼、遙控監察、影像及錄像存取等。

研究員：蕭允治教授(研究中心總監)、馮大淦教授、陳銳霖博士、陳旭晞博士、池哲儒博士、林健文博士、羅毅芳博士、盧鏡泉博士及倫柏江博士。
總研究項目資助(合共八個項目)：港幣二百九十萬元

邁向尖端建築技術

土木及結構工程學系今年共有十二個研究項目獲研資局撥款，其中一個將研究

使用纖維加強聚合物，作為嶄新的建築材料。

這種建築材料強度高於鋼材十倍以上，並在土木工程方面有極大發展潛力，有助加固有問題的混凝土建築物。有關研究將為本地建築業帶來突破，協助解決本港有問題建築物的鞏固工作，並為國內在這方面的研究作出貢獻。

首席研究員：理大土木及結構工程學系教授滕錦光教授

副研究員：
清華大學土木工程學系教授
葉列平教授

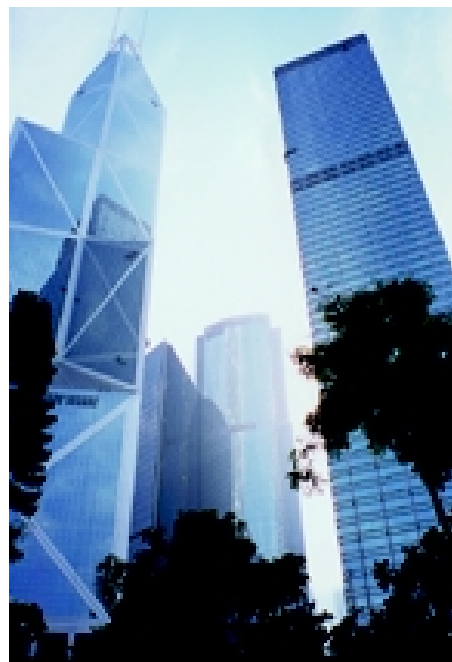
理大土木及結構工程學系研究員
林力博士
愛丁堡大學建築及環境學院講師
陳建飛博士

研究項目資助：港幣一百零一萬元

智能物料開創潮流

在紡織及製衣學系本年獲批的研究項目中，其中一個採用納米技術研發光子纖維物料，在理大多個研究項目中奪得最多撥款。

該項目主要發展一種創新智能物料，具有發光、控色的功能，並可顯示會移動的映像。項目更探討有關物料的結構特性及組織，並首次採用統一的理論策略，在



光子纖維研究方面擔當重要角色。有關物料將可廣泛應用於通訊、運輸設備、家居用具及裝飾等物品上，為本港及海外的成衣及服裝業開闢新天地。

首席研究員：紡織及製衣學系系主任
陶肖明講座教授

副研究員：紡織及製衣學系副教授
昕治忠博士

研究項目資助：港幣一百零七萬元