

Work and R&D Achievements in Recent Years
of the Twelve Partner State Key Laboratories (SKL) in Hong Kong

1. Partner SKL of Emerging Infectious Diseases (University of Hong Kong) 新發傳染性疾病國家重點實驗室夥伴實驗室(香港大學)

- This Partner SKL was established after Premier Wen Jia Bao's visit to the university in recognition of the outstanding contributions made by HKU scientists during the SARS outbreak in 2003, with the Chinese Center for Disease Control and Prevention (China CDC, 中國疾病預防控制中心) as the Mainland partner.
- It was equipped with facility compatible to the Biosafety Level 3+.
- The laboratory's research is focused on emerging infectious diseases including avian, other animal and human viruses such as influenza virus, coronaviruses and other viruses. Study on novel emerging antimicrobial resistance in bacteria isolated from animals and human are conducted.
- The laboratory's achievements include the discovery of novel microbes which may be associated with human or animal diseases, including the human, civet and bat SARS coronaviruses. Many of the novel bacteria and fungi discovered were named after Hong Kong and China, such as *Laribacter hongkongensis* in fish, frogs and human as well as *Streptococcus sinensis* and *Lichtheimia hongkongensis*. The majority of these microbes were originally found in clinical specimens before being traced back to an animal source.
- The laboratory's research findings led to the successful control of SARS re-emergence by the banning of game food animals in wild life markets as well as the control of avian influenza H5N1 virus in Hong Kong.
- The laboratory's research findings are published in leading journals such as Nature, Nature biotechnology, Science, PNAS, Journal of Virology, Journal of Infectious diseases and Journal of Clinical Microbiology.
- Major sources of funding were from Research Grants Council

(RGC), Research Fund for the Control of Infectious Diseases (RFCID), Areas of Excellence (AoE) schemes of the UGC, and National Institutes of Health (NIH).

2. Partner SKL of Brain and Cognitive Sciences (University of Hong Kong) 腦與認知科學國家重點實驗室夥伴實驗室 (香港大學)

- Researchers in this Partner SKL have used functional and structural magnetic resonance imaging (fMRI and sMRI) to conduct interdisciplinary studies of the abnormal brain functions and structures that cause dyslexia, autism, depression, anorexia nervosa and schizophrenia.
- The laboratory has also undertaken neuroprotection research on the central nervous system, focusing on glaucoma, multiple sclerosis, depression, Alzheimer's Disease, traumatic injury of spinal cord and optic nerve.
- The genetics group of this laboratory has identified novel susceptibility genes for schizophrenia and epilepsy, and developed novel statistical methods and software for genetic studies.
- It also received funding from the Ministry of Science and Technology (MOST, 科學技術部), including the 973 program, and Innovation and Technology Commission (ITC)

3. Partner SKL of Oncology in South China (Chinese University of Hong Kong) 華南腫瘤學國家重點實驗室夥伴實驗室 (香港中文大學)

- The Partner SKL performed basic and applied researches on diagnosis and treatment of Nasopharyngeal carcinoma (NPC), liver cancer and anti-cancer gene therapy.
- The research work had been very successful in locating the effective targets for many cancer diseases. Last year, their research publication was doubled in volume.
- Some of their research projects were funded by the national “973” and “863” programs. The laboratory also received funding support from Research Grants Council (RGC), and ITC.

4. Partner SKL of Agrobiotechnology (Chinese University of Hong Kong) 農業生物技術國家重點實驗室夥伴實驗室 (香港中文大學)

- Rooted from the UGC-Area of Excellence on Plant and Agricultural Biotechnology (2000-2011), this partner SKL has gathered Hong Kong scientists to perform cutting edge agricultural researches, in Mainland and worldwide, on crop improvement (yield, quality, and stress tolerance) and seed bioreactors. Also, researches on animal development and stem cell are being carried out.
- Laboratory members have won important national and international recognitions, including one Academician of Chinese Academy of Engineering and International Eurasia Academy of Sciences, one foreign specialist, through the Provincial 100-Talent Program of Shanxi, two Croucher Foundation Senior Research Fellows, and one featured by Nature, a leading scientific journal, as one of “Five Crop Researchers Who Could Change the World”.
- The Laboratory has published a total of 580 high quality academic papers, with high number of citations by other journal articles. In particular, the soybean genomic study led by Profs. Hon-Ming Lam and Samuel Sun was published as a cover story in the Dec. 2010 issue of Nature Genetics.
- The Laboratory has made knowledge transfer by filing patent applications worldwide (accounting 7 in US, 2 in Hong Kong, 2 in China and 1 in Taiwan).
- During 2000 and 2010, the Laboratory trained totally 282 graduate/undergraduate students and other skilled biotechnologists.
- The Laboratory takes part in important international and national research projects, including the ProVitaMin Rice project, supported by the Grand Challenges in Global Health initiative of the Bill & Melinda Gates Foundation, the China National Hybrid Rice Project, and the China National Transgenic Initiative. Thus far, the Laboratory’s global network includes 57 prominent research institutions with 90 collaborative projects.

5. Partner SKL of Millimeter Waves (City University of Hong Kong) **毫米波國家重點實驗室夥伴實驗室(香港城市大學)**

- This Partner SKL was inaugurated in 2008 with a mission to carry out fundamental and applied research for the advancements of communication technologies in Hong Kong and China. Since inception, 5 members of the laboratory have been elected IEEE fellows.
- Undergraduate and graduate students trained in this laboratory received numerous international student awards including the International Fulbright Science and Technology Fellowship in 2007 awarded by US Department of State.
- The laboratory had trained up many outstanding researchers, some of whom were subsequently employed by multinational companies (namely Nokia and Research in Motion, the brand owner of Blackberry), overseas universities (like National University of Singapore and University College London) and electronic and communication companies in Hong Kong and Pearl River Delta.
- Small antennas developed by the laboratory for the Chinese global navigation satellite system, Beidou, were integrated into mobile terminals that were successfully deployed in the rescue missions in the Wen Cun (汶川) earthquake in 2008. Beidou features both positioning and short messages (SMS) functions.
- The laboratory also received funding from the Mainland, i.e. the National Astronomical Observatories (國家天文台), to develop antennas and radio frequency integrated circuits (RFICs) for the China Area Positioning System (CAPS). This new GPS system will provide both positioning and speech communication capabilities.
- The laboratory received \$12 million from ITC to develop a smart base-station antenna system for Long-Term Evolution (LTE) mobile communications.

6. Partner SKL of Phytochemistry and Plant Resources in West China (The Chinese University of Hong Kong)

植物化學與西部植物資源持續利用國家重點實驗室夥伴實驗室(香港中文大學)

- Supported by AoE funding, the Hong Kong laboratory conducted applied basic researches to develop biological and clinical trial platforms for testing the effectiveness of herbal medicine.
- It also developed biochemical and chemical markers for authentication of herbal medicine. Together with the DNA fingerprinting technology. These markers would be very useful for development of the Hong Kong Chinese Materia Medica Standards (香港中藥材標準).
- The laboratory collaborated with the Hong Kong Institute of Biotechnology (HKIB) for drug development and manufacturing.
- Bioassay guided method was used to purify active components in medicinal plants. With this method, anti-cancer, anti-fungi, and herbs with effect on cardiovascular health, and wound healing are intensively studied.
- Rare species like *Rubinoboletus ballouii* (玉紅牛肝菌) and *Erigeron breviscapus* (燈盞花) were sent from Yunnan to Hong Kong for intensive studies on their medicinal values.
- The Partner SKL, together with its partner in Kunming, possesses the capability in purifying herbal medicine, which is essential in producing the Traditional Chinese Medicine, like Yunnan Paiyao (雲南白藥).
- Other common research areas include the search for anti-HIV herbs, for AIDS treatment.
- The Hong Kong laboratory had taken up projects funded under the AoE scheme of the UGC and the Guangdong-Hong Kong Collaboration of the ITF.

7. Partner SKL of Molecular Neuroscience (The Hong Kong University of Science and Technology)

分子神經科學國家重點實驗室夥伴實驗室(香港科技大學)

- The groundwork for this partner SKL was laid through the establishment of the Molecular Neuroscience Center (MNC) at HKUST and received fund under the AoE scheme of the UGC. The AoE scheme, together with support from the ITC and the Hong Kong Jockey Club Charities Trust, also contributed towards the development and implementation of the required framework for this Partner SKL.
- The laboratory aims to investigate important fundamental questions in the nervous system, such as the development, function, and plasticity of nerve cells, and the pathophysiology of neurological diseases.
- Discoveries resulting from this work will enhance the current understanding of brain function, and help in the development of effective therapeutics to treat neurological diseases and disorders such as Alzheimer's disease, Parkinson's disease, stroke, and depression.
- The research team has already made significant breakthroughs by unravelling key signal mechanisms underlying specific disease states, and identifying new drug targets.

8. Partner SKL of Marine Pollution (City University of Hong Kong)

海洋污染國家重點實驗室夥伴實驗室(香港城市大學)

- This Partner SKL's objective is to protect the marine environment of Hong Kong and South China by identifying major threats such as algal toxins and contaminants of emerging environmental concern, and developing tools and technologies to address and solve these problems.
- The laboratory previously developed novel ways of detecting these threats using chemical and biological methods (e.g. using a green fluorescent fish that glows when in contact with endocrine-disrupting chemicals; using chemical sensors for

- detecting contaminants).
- The laboratory has also worked on ways of monitoring the impacts and assessing the risks of marine pollutants to environmental and human health, as well as on the control and remediation of pollutants.
 - It has previously received fund under the AoE scheme of the UGC, and further funding was obtained from a consultancy project to set marine environmental criteria for the Environmental Protection Department and a consultancy project on marine surveillance for Agriculture, Fisheries and Conservation Department.

9. Partner SKL of Ultraprecision Machining Technology (Hong Kong Polytechnic University)

超精密加工技術國家重點實驗室夥伴實驗室(香港理工大學)

- This Partner SKL conducted research on nano-machining mechanics, energy efficient lighting technology, advanced optics in aeronautics and astronautics, bionic nano-structures and development of equipment/facilities for ultra-precision machining and metrology.
- The laboratory has maintained the capability in up keeping the future development of the ultra-precision equipment and facilities.

10. Partner SKL of Chirosciences (Hong Kong Polytechnic University)

手性科學國家重點實驗室夥伴實驗室(香港理工大學)

- This Partner SKL started with a project funded under UGC's AoE scheme, and from that they had been working on drug discovery and synthesis for many years.
- The first drug developed by the partner SKL was a liver cancer drug, which had undergone the phase 2 clinical trials.
- A number of catalysts developed for chiral synthesis in this laboratory have been successfully licensed to industries in Hong Kong, Mainland and overseas.

11. Partner SKL on Synthetic Chemistry (University of Hong Kong)
合成化學國家重點實驗室夥伴實驗室(香港大學)

- The Partner SKL is staffed with highly regarded scientists nationally and internationally, including 3 Academicians of Chinese Academy of Sciences, 3 State Natural Science Awards, 2 TWAS Prizes in Chemistry, 1 L'Oreal-Unesco Women Scientists Award, and 1 Chinese Young Women in Science Fellowship. They received funding from AoE programs of UGC, ITF Support Programmes, RGC Collaborative Research Funds, and National Natural Science Foundation of China/HK RGC Joint Research Schemes.
- It aims to create/identify novel chemical entities with important applications, and to devise/develop environmentally friendly methods for the synthesis of chemical entities. Its mission is to develop research programs that would bring research areas on functional molecular materials and chemical biology together, and to use the complementary expertise of these two areas in a synergistic way.
- The laboratory makes use of improved metal catalysis technology for construction of organic compounds with high efficiency and selectivity. It focuses on the design and synthesis of metal catalysts for organic transformations in drug discovery and materials synthesis, with emphasis on the development of catalysts for environmentally benign and green transformations, particularly, in the activation of small molecules and/or selective functionalization of saturated hydrocarbons.
- Given the increasing concern for better and cleaner environment for the chemical industry in Mainland, the researches in 'green chemistry' should have high potential for growth.

12. Partner SKL for Liver Research (University of Hong Kong)
肝病研究國家重點實驗室夥伴實驗室(香港大學)

- This Partner SKL undertook frontier multidisciplinary basic and translational research on liver diseases including those developed from hepatitis B virus (HBV) infection.

- The Laboratory engaged in cutting-edge basic laboratory research and devising better diagnoses, and new and better treatment modalities for HBV infection, cirrhosis and liver cancer. The long-term objective is to reduce the incidence and mortality of hepatitis and liver diseases in Hong Kong.
- The Laboratory had been involved in projects funded by the RGC and ITC. It is staffed with high profiled scientists and has outstanding achievements, including the First Class Award of the National Science and Technology Award for their research on liver transplantation.

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