



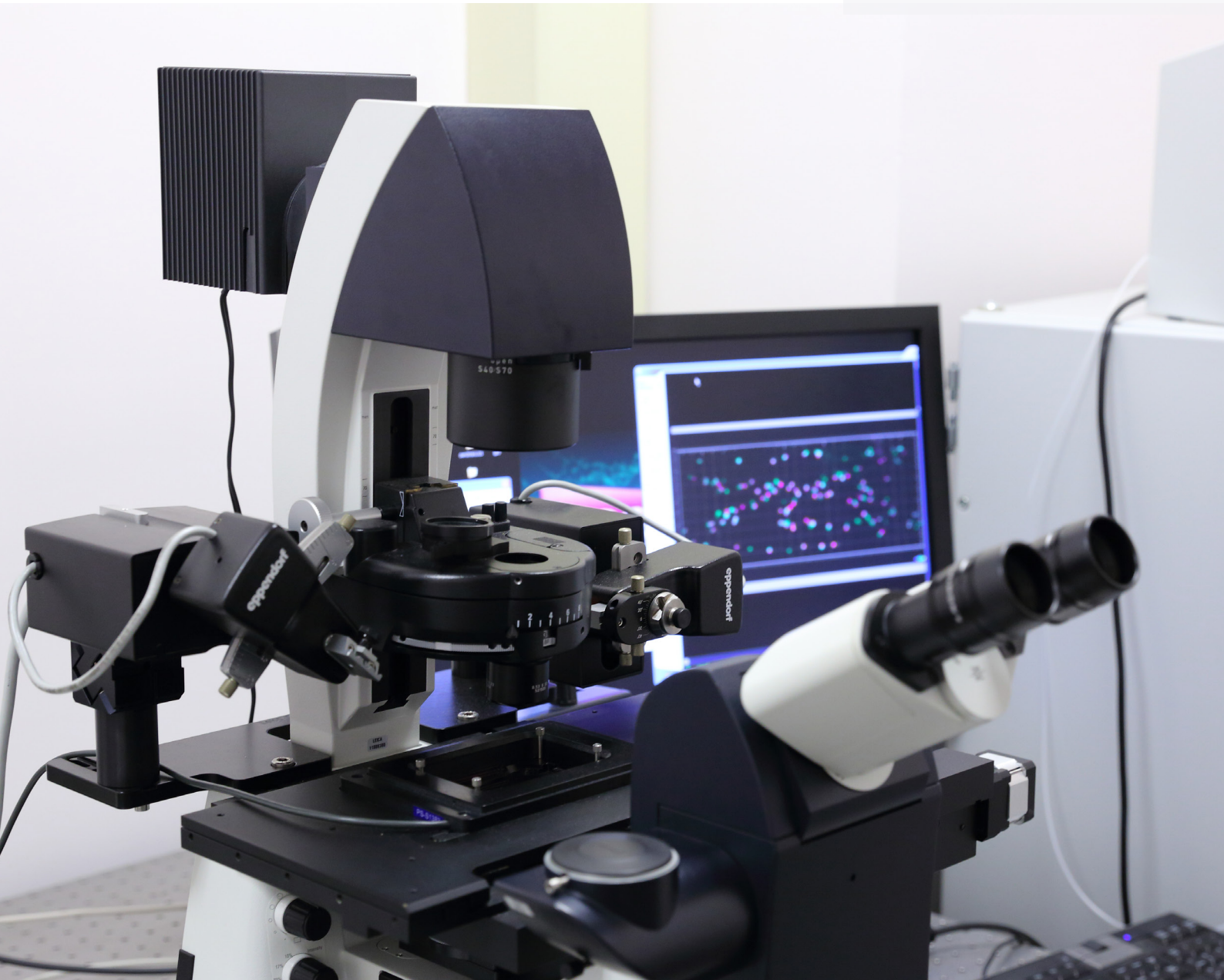
香港中文大學理學院  
**FACULTY OF SCIENCE**  
THE CHINESE UNIVERSITY OF HONG KONG

# Research Day 2018

11 June 2018 Monday

9:15a.m. - 12:20p.m.

L3, Science Centre





**Science Empowers your Dreams**

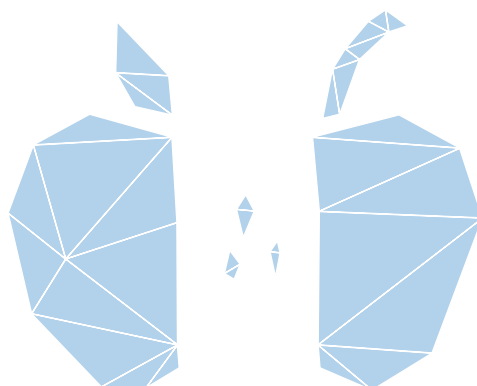


# PROGRAMME

09:15 - 09:30	Opening Ceremony
09:30 - 10:15	<b>From Fundamental Research to Popular Products</b> <i>Professor WANG Jun</i> Founder & CEO of GeneHarbor (Hong Kong) Biotechnologies Ltd. Adjunct Professor, School of Life Sciences
10:15 - 10:40	<b>Soybean Stress Tolerance Research – from Laboratory to Field</b> <i>Professor LAM Hon Ming</i> Professor, School of Life Sciences
10:40 - 11:00	Tea Break
11:00 - 11:25	<b>Cu(InGa)Se<sub>2</sub> solar cells – from Laboratory Research to Commercialization</b> <i>Professor XIAO Xudong</i> Professor, Department of Physics
11:25 - 11:50	<b>A Memory Reduction Method in Pricing American Options</b> <i>Professor CHAN Hon Fu Raymond</i> Choh-Ming Li Professor of Mathematics, Department of Mathematics
11:50 - 12:15	<b>From Lab to Market</b> <i>Professor YU Chai Mei Jimmy</i> Choh-Ming Li Professor of Chemistry, Department of Chemistry
12:15 - 12:20	Event Closing



卓越  
研究



## Excellence in Research

The Faculty of Science is proud to be home of over 100 dedicated scientists conducting cutting-edge research in various areas of science. Our staff and students remain committed to our Faculty's Mission in expanding the frontiers of human knowledge, aiming to build a better world for the future.

理學院擁有一支充滿熱誠的科研隊伍，逾百名科學家在多個領域進行尖端研究。我們的教職員與學生將秉承一貫的宗旨，擴展人類知識領域，為未來建立一個更美好的世界。



# Message from the Interim Dean of Science

Welcome to the Faculty of Science Research Day 2018. Every year, the Faculty organizes a Research Day where staff members would have a chance to share matters concerning the promotion of research at the Faculty. The highlight of this year's Research Day is on knowledge transfer, in particular, from fundamental research to products available to the market.



All Faculties in the University have been putting a lot of efforts in the Research Assessment Exercise (RAE) 2020, which is a crucial exercise to inform the block grant funding from the UGC. A new feature of impact cases will be introduced and it will contribute 15% to the whole RAE assessment in RAE 2020. Together with the emphasis on promoting innovation and technology by the government, knowledge transfer becomes an important element for moving minds to markets, and creating impact on society from fundamental research to product development.

Conversion of research results and achievements into commercially available products requires tremendous efforts and time, and it is never an easy task. We are fortunate to be able to invite five speakers to share with us their invaluable experience in transforming innovative research into products, jobs, and businesses to deliver social mission. Professor Wang Jun, who co-founded a tech unicorn company GeneHarbor (Hong Kong) Biotechnologies Ltd. 14 years ago, will share with us his lessons and thoughts on the transition from an academic to a business person. Professor Lam Hon Ming will share his experiences on the translation of basic research to agricultural applications on the field. Professor Xiao Xudong will share his experiences working from the laboratory research to the commercialization of a high efficient photovoltaic absorber layer in thin film solar cells. Professor Chan Hon Fu Raymond will share with us how a memory reduction method can improve the accuracy in pricing American Options. In the last part, Professor Yu Chai Mei Jimmy will share with us how enormous impact on the use of  $\text{TiO}_2$  has filled the gap between fundamental research and product development.


It is indeed our pleasure to have a Panel of five distinguished speakers today. I am sure the event today is an invaluable and unique occasion for exchange of ideas for both our junior and senior staff members. I wish you every success in your research grant applications and submission in RAE.

Yours sincerely,

A handwritten signature in black ink, consisting of stylized cursive letters that appear to be 'XZ'.

XIE Zuowei





# Presentation Abstracts and Speaker Introductions





## Professor WANG Jun

Founder & CEO of GeneHarbor (Hong Kong)  
Biotechnologies Ltd.

Adjunct Professor, School of Life Sciences

Dr. Wang, PhD (Molecular Biology), University of Wisconsin-Madison, was a staff in the Biochemistry Department of the CUHK during 1992-2003. He is currently the founder and CEO of GeneHarbor (Hong Kong) Biotechnologies Ltd., and adjunct professor at the CUHK. Focusing on the development of *in vitro* enzymatic synthesis, he has been working in universities, biotech companies in China, USA, Australia and Hong Kong for over 40 years, and is the inventor and co-inventor of more than 80 patents. Dr. Wang is a tutor of HKX Technology Fund and member of Research Projects Assessment Panel of Innovation & Technology Fund (ITF) of HKSAR.

## From Fundamental Research to Popular Products

In this three-part presentation, Dr. Wang will first outline a number of tech unicorns or unicorn-to-be in Hong Kong, including GeneHarbor, a company he co-founded 14 years ago. He will also highlight the exciting development of NMN (nicotinamide mononucleotide), an anti-aging compound that is intrinsic to human body and with approved efficacy. Next, Dr. Wang will discuss the advantages and disadvantages of entrepreneurship in the territories and the resources available to start-ups. Finally, he will share the teachers and students his lessons and thoughts on the transition from an academic to a business person.





## Professor LAM Hon Ming

Professor, School of Life Sciences

Professor Lam is a native Hong Kong scientist obtaining his BSc and MPhil in Biology from The Chinese University of Hong Kong (CUHK). After receiving his PhD degree in Molecular Biology & Biochemistry from Northwestern University in Chicago, he worked as a research scientist at New York University, before returning to his *alma mater* in 1997. Prof. Lam is currently a Professor in the School of Life Sciences at CUHK and also the Director of the Molecular Biotechnology Program. Concurrently, he serves as the Director of the Partner State Key Laboratory of Agrobiotechnology (CUHK), a national level research center approved by the Ministry of Science and Technology, PRC. Recently, he leads a team of plant and agricultural researchers and successfully secured funding from the RGC Area of Excellence (AoE) Scheme to establish the UGC AoE-Center for Genomic Studies on Plant-Environment Interaction for Sustainable Agriculture and Food Security. Prof. Lam has extensive publications in renowned science journals including *Nature*, *Nature Genetics*, *Nature Communications*, *Nature Plants*, *PNAS*, *Lancet*, and etc. His vision is to combine state-of-the-art technology with traditional wisdom of field breeders, and contribute to food security, climate-smart agriculture, and sustainable environment.

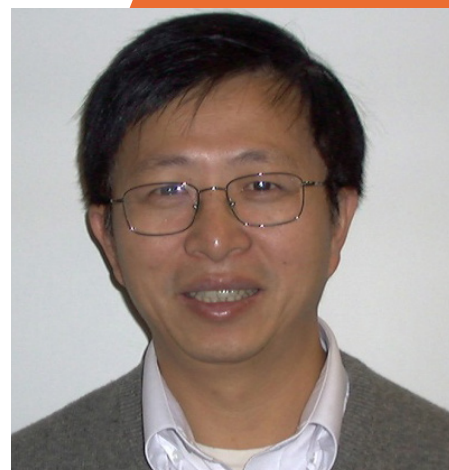
## Soybean Stress Tolerance Research – from Laboratory to Field

Our basic researches in the laboratories have led to major scientific breakthroughs that can be translated into agricultural application on the field. We have identified and cloned a major salt tolerance gene from wild soybeans using genomic approach, representing a milestone in the mass production of high quality salt tolerant soybean. We collaborate with soybean breeders in China and have developed new salinity and drought tolerant soybeans that can be grown with non-genetically modified techniques on arid lands. This will benefit the global agricultural productivity by increasing crop yields, restoring arable lands, as well as providing economic sustainability to farmers.



# Professor XIAO Xudong

Professor, Department of Physics



Professor Xiao received his Ph. D. degree in physics at the University of California at Berkeley in 1992. After his further training in the Lawrence Berkeley National Laboratory as a post doctorate fellow, he joined the Department of Physics at the Hong Kong University of Science and Technology in 1994, where he directed his research in surface science and nano science with both optical techniques and scanning probe microscopies. In 2007, Prof. Xiao moved to the Chinese University of Hong Kong and branched his research to photovoltaic solar energy. He is a recipient of the Outstanding Yong Scientist Fund, Chinese National Science Foundation, 2004 and an awardee of “Thousand Talents Scheme”, China, 2010. Prof. Xiao has made various contribution to surface science, nano science and renewable energy science and engineering, including inventing linear optical diffraction method for detecting submonolayer surface diffusion, discovery of room temperature “ice-like” water structure, developing quantitative tribology at nanoscales, experimentally demonstrating quantum capacitance of nano-junctions, discovery of pseudogap state in the nano-island of conventional superconductors, and successful fabrication of the best efficiency Cu(InGa)Se<sub>2</sub> solar cell in Great China Region. In addition to the lab device fabrication and physics study of various thin film solar cells, Prof. Xiao is also leading a team to develop instrumentation and production lines for manufacture Cu(InGa)Se<sub>2</sub> thin film solar panels in China.

## Cu(InGa)Se<sub>2</sub> solar cells – from Laboratory Research to Commercialization

Cu(InGa)Se<sub>2</sub> (CIGS) is a well-known copper-based chalcogenide compound semiconductor and has been successfully applied as photovoltaic absorber layer in thin film solar cells with a record efficiency of 22.6%. In this talk, I will share my experience working from the laboratory research to the commercialization. To commercialize the technology in China, we have taken an approach to start from production of manufacturing equipment. This allows us first to control the overall cost of the CIGS panel and second to facilitate the best matching between production line and process technology. The progress of our flexible CIGS panels will be presented.





## Professor CHAN Hon Fu Raymond

Choh-Ming Li Professor of Mathematics,  
Department of Mathematics

Professor Chan graduated with First Class Honors from the Department of Mathematics at The Chinese University of Hong Kong. He then obtained his M.Sc. and Ph.D. degrees in Applied Mathematics in New York University. Prof. Chan began his career as a tenure-track Assistant Professor at the University of Massachusetts at Amherst in 1985. With heart and mind always in Hong Kong, he came back to Hong Kong in 1986, first at The University of Hong Kong (1986-92) and then at The Hong Kong University of Science and Technology (1993) before joining his *alma mater* in 1993.

Prof. Chan has published 130 journal papers and has been in the ISI Science Citation List of 'Top Highly-Cited Mathematicians in the world (2001 List)'. He won a Leslie Fox Prize for Numerical Analysis in 1989; a Feng Kang Prize of Scientific Computing in 1997; a Morningside Award in 1998; and 2011 Higher Education Outstanding Scientific Research Output Awards (First Prize) from the Ministry of Education in China. He was elected a Fellow of the US Society of Industrial and Applied Mathematicians (SIAM) in 2013 and a SIAM Council Member for 2015-20. His research interests are in numerical linear algebra, image processing and financial mathematics.

## A Memory Reduction Method in Pricing American Options

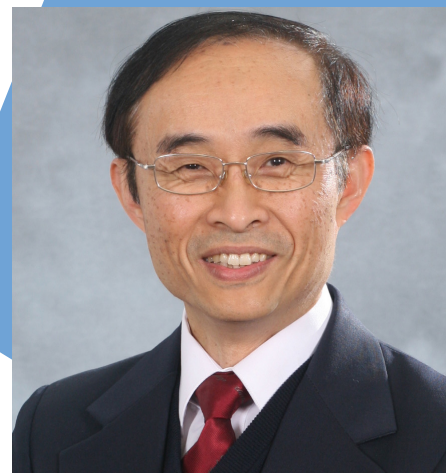
This talk is about the pricing of American options by simulation methods. In the traditional methods, in order to determine when to exercise, we have to store the simulated asset prices at all time steps on all paths. If  $N$  time steps and  $M$  paths are used, then the storage requirement is  $O(MN)$ . Here we present a simulation method for pricing American options where the number of storage required only grows like  $O(M)$ . The only additional computational cost is that we have to generate each random number twice instead of once. For machines with limited memory, we can now use a larger  $N$  to improve the accuracy in pricing the options.



# Professor YU Chai Mei Jimmy

Choh-Ming Li Professor of Chemistry,  
Department of Chemistry

Professor Yu received his Ph.D. degree in Environmental Analytical Chemistry from the University of Idaho in 1985. He taught in the USA before joining The Chinese University of Hong Kong in 1995. Prof. Yu is now Choh-Ming Li Professor of Chemistry, Head of United College and Associate Director of the Institute of Environment, Energy and Sustainability. As a leading scientist in the field of photocatalysis, Prof. Yu appears on the lists of Highly Cited Researchers 2016 in both Chemistry and Materials Science. The editorial of *Chemistry of Materials* on 10 March 2015 was dedicated to Prof. Yu as he “had an enormous impact on the many areas that use  $\text{TiO}_2$ ”.



## From Lab to Market

Despite all the talks about the third mission of a university, very few of us in the Faculty of Science are working with industrial partners to develop commercial products. The lack of knowledge transfer activities puts us in a difficult position when it comes the time for research impact assessment. This presentation uses photocatalytic technology as an example to show how to fill the gap between fundamental research and product development. Ideas on identifying potential industrial partners and strategies for the application of Innovation and Technology Fund will be shared. After surviving the game of publish or perish, what could be more satisfactory than seeing your own products in a department store?





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