



Shun Hing Distinguished Lecture Series 2006

From Functional Molecules to Complex Systems

Professor Chih-Ming Ho

**Ben Rich – Lockheed Martin Professor
Director, Institute for Cell Mimetic Space Exploration,
University of California, Los Angeles, USA**

Date: 4 October 2006, Wednesday

Time: 5:00 p.m. (Reception starts at 4:30p.m.)

Venue: TY Wong Hall, 5/F, Ho Sin Hang Engineering Building, CUHK

Abstracts

The rapid developments of nanotechnologies have driven the production of molecular-scale devices towards the functionalizing of materials, directly manipulating of genetic molecules and engineering strains of proteins to possess novel functionalities. The human body of meter size is an extremely complex adaptive system. The question of how we will span from the nano-scale molecules to complex systems with much large length scales and eventually will enable us to enrich human lives is not obvious, but a key task.

Cell fuses genetic informatics with functional molecules to result in the smallest complex system in nature. In this presentation, we will illustrate the capability of inducing cell toward desired destiny as an example of controlling a complex system across a wide span of length scales, from nanometer to microns. Part of the challenge is that millions of functional molecules inside a cell are governed by networks of signal pathways which are still beyond comprehension. In addition, while a cocktail of cytokines is used to yield cells toward a final desired phenotype, exploring all of the possible combinations of these stimuli can result in a very large number of trials. The test covering all the combinations can not be carried out in a realistic time frame to find the most potent combination. Applying the engineering feedback control concept, we can search and reach the optimum condition with a very small number of trials. We have demonstrated that optimally designed time-varying stimulations can self-organize and adjust the functionalities across multiple length scales to efficiently reach the desired state. This may yield new insight into unlocking and acquiring novel control modalities of the underlying mechanisms that drive the natural processes of life.

Biography of Speaker

Dr. Chih-Ming Ho holds the Ben Rich-Lockheed Martin Chair Professor in School of Engineering. He is the Director of Institute for Cell Mimetic Space Exploration (CMISE). After receiving his Ph.D. from The Johns Hopkins University, Dr. Ho started his career at the University of Southern California and rose to the rank of Full Professor. In 1991, he moved to the University of California, Los Angeles to lead the establishment of the micro-electro-mechanical-system (MEMS) field in UCLA and served as the founding Director of the Center for Micro Systems. To this day, the UCLA MEMS research has been recognized as one of the top programs in the world. He served as UCLA Associate Vice Chancellor for Research from 2001 to 2005.

He is an internationally renowned researcher in bio-nano technology, micro/nano fluidics, and turbulence. He was ranked by ISI as one of the top 250 most cited researchers in all engineering category around the world. In 1997, Dr. Ho was inducted as a member of the National Academy of Engineering. In the next year, he was elected as an Academician of Academia Sinica which honors scholars of Chinese origin with exceptional achievements in liberal arts and sciences. Dr. Ho holds five honorary professorships. He has published 260 papers and 10 patents. Among over 200 presentations in the international conferences, more than 100 of them are keynote talks. Dr. Ho was elected Fellow of the American Physical Society as well as American Institute of Aeronautics and Astronautics for his contributions in a wide spectrum of technical areas.

***** **ALL ARE WELCOME** *****

ENQUIRIES: SHIAE, CUHK, Tel: 3163 4351