



The Chinese University of Hong Kong  
**Department of Biomedical Engineering**



**Time: 10:00am, 19 October 2018 (Friday)**

**Venue: Room 702, William M W Mong Engineering Building, CUHK**

**Surface Plasmon Effects for Biosensing and Photonics Trapping Applications**



**Professor Aaron Ho-Pui HO**  
**Professor**  
**Department of Biomedical Engineering**  
**The Chinese University of Hong Kong**

**Abstract**

Surface plasmons are generated when photons interact with free electrons in a metal object. In recent years, the topic of plasmonics has been under intense investigation in light of its wide range of application possibilities. One such application is concerned with biosensing. The so-called surface plasmon resonance (SPR) has emerged as an effective approach for label-free detection of binding between bio-molecular species. Over the years, we have been exploring new designs to increase the detection sensitivity of SPR biosensors, particularly those with the incorporation of interferometers for phase-sensitive detection. Phase-sensitive measurement approach does not require any change in the angle of incidence, thus making it very suitable for imaging applications, which also leads to parallel sensing of multiple analytes. In this presentation, several novel techniques for achieving high resolution limits will be addressed.

The second half of this talk deals with the use of plasmonic absorption in gold nano-islands. We demonstrate several applications based on the use of plasmon-absorption induced localised heating in optofluidics, including optical trapping and assembling of particles and live cells into highly organized pattern with low power and optically actuated microfluidic flow guiding and valves. The observed trapping effect is attributed to optical forces from localized surface plasmons combined with thermal convection that pushes the target objects into the trapping zone. It is found that thermophoresis plays a critical role in the system. More recently we have reported trapping by purely resistive-heating, i.e. photon-free, devices. This work provides a simple platform for on-chip optical manipulation of nano- and micro-sized objects, and may find applications in physical and life sciences.

**Biography**

Dr Ho received his BEng and PhD in Electrical and Electronic Engineering from the University of Nottingham in 1986 and 1990 respectively. Currently a professor in the Department of Biomedical Engineering, The Chinese University of Hong Kong (CUHK), he has been with the Department of Electronic Engineering during 2002-2017 and held positions as Associate Dean of Engineering (2007-09), CUHK, Assistant Professor in Department of Physics and Materials Science, City University of Hong Kong (1996-2002), and Senior Process Engineer for semiconductor laser fabrication in Hewlett-Packard (1994-96). His service to the professional and academic community includes Chairman of Hong Kong Optical Engineering Society (2010-12), Chairman of IEEE Electron Device/Solid-State Circuits (ED/SSC) Hong Kong Chapter (2007-09), Admission Panel member of Technology Business Incubation Programme (IncuTech) operated by Hong Kong Science and Technology Parks Corporation (HKSTP) (2014-to date), Council Member, The Technological and Higher Education Institute of Hong Kong (THEi) (2012-to date), Advisory Board Member of Higher Education Advisory Committee in Vocational Training Council (VTC) (2010-2017). Started as a compound semiconductor material scientist, his current academic interests focus at nano-sized semiconductor materials for photonic and sensor applications, optical instrumentation, surface plasmon resonance biosensors, lab-on-a-chip and biophotonics. He has published over 300 peer-reviewed articles, 33 Chinese and 6 US patents. He is a Charter Engineer, Fellow of International Society for Optics and Photonics (SPIE) and Hong Kong Institution of Engineers (HKIE).

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

*For enquiries, please contact Ms Heidi Chan, Department of Biomedical Engineering at 3943 8261*