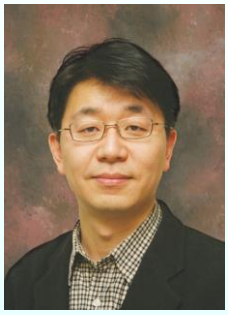
The Chinese University of Hong Kong

Department of Biomedical Engineering

Time: 10:30 am, 7 September 2019 (Saturday)
Venue: Room 222, Ho Sin-Hang Engineering Building

Nanoplasmonics: Sensing, Imaging, and Applications to Multiscale Molecular Dynamics



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Abstract

In this presentation, optical molecular imaging and sensing techniques based on light localization are to be discussed. The creation of locally amplified electromagnetic near-fields on surface plasmon-enhanced nanoplasmonic structures has been investigated in many studies because of the potential for extreme light confinement to improve molecular detection sensitivity and resolving power for imaging processes that would be typically impossible to observe under the diffraction limit. By colocalization of light-matter distribution using nanoplasmonic surfaces, it was shown that improvement of detection sensitivity by several orders of magnitude would be plausible. For imaging, although many emerging microscopy approaches have been highly successful to produce super-resolved images beyond imagination, we explore alternative techniques based on nanoplasmonic surfaces by which achievable resolution may be customized to fit specific imaging needs. Feasibility studies on multiscale dynamics of molecular complexes such as internalization of virus particles, sliding microtubules, intracellular mitochondrial movement, and bacterial motility on random and periodic plasmonic surface patterns performed. To be also described in this presentation is the switching-based light localization to circumvent the diffraction limit of far-field optics under the Rayleigh criterion, thereby implement full-field super-resolution microscopy. Localization switching can also be used to improve image resolution of label-free surface plasmon microscopy which suffers from plasmon scattering in a conventional set-up. Improvement of surface coverage of localized fields is discussed using random nanocomposite islands for light switching.

Biography

Donghyun Kim received B.S. and M.S. degrees in electronics engineering from Seoul National University in 1993 and 1995, and Ph.D. degree in electrical engineering in the area of novel multidimensional display technologies and smart optical filters from Massachusetts Institute of Technology in 2001. He was with Corning Inc., Corning, NY, as a Senior Research Scientist and with Cornell University, Ithaca, NY, as a Postdoctoral Associate. Since 2004, he has been with the School of Electrical and Electronic Engineering, Yonsei University, Seoul, as a Professor. He is jointly affiliated with the Program for Nanomedical Science and Technology and is currently the Director of the Yonsei Institute of Medical Instrumentation Technology. His research interests include biomedical applications of optics and optoelectronics focused on nanophotonic technology and applications in biomedical engineering based on plasmonic techniques

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

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