

CHEMICAL ENGINEERING

SEMINAR SERIES



MICHAEL GORDON

Monday, March 06, 2017

Associate Professor of Chemical Engineering UCSB

Engineering nanostructures for photonics, energy, and materials characterization applications

ABSTRACT: This talk will highlight some of our recent work in bio-inspired photonics and plasmonics related to controlling reflection at interfaces and nanoscale chemical imaging of surfaces. In the former, synthetic 'moth eye-inspired' (ME) anti-reflective (AR) structures were created in different material platforms for applications in IR detection / imaging and solid state lighting. Large increases in transmission, bandwidth, directional response and light extraction were obtained in a variety of IR and III-V nitride materials used for electro-optics and LEDs. Effective medium theory, FDTD simulations, and quantitative measurements of transmission, reflection and scattering were used to understand the optical physics of these ME-based surfaces.

In the materials characterization realm, we are developing hybrid atomic force microscopes that manipulate light below the diffraction limit ($\lambda/2$) to locally image surface structure and chemistry at 'super resolutions'. Nanometer-scale optical fields are created near an optical 'antenna' when laser light excites plasmons (collective oscillations of free electrons) in the antenna material, allowing vibrational spectroscopy and chemically-specific surface imaging below the diffraction limit. Examples to be discussed include super resolution imaging of phonons in SiGe nanowires and various Raman modes of patterned organics.

BIOGRAPHY: Mike is an Associate Professor in the Department of Chemical Engineering at UCSB. He received his BS/MS (ChemE) from the Colorado School of Mines, MS (Applied Physics) and PhD (ChemE) from the California Institute of Technology, and was a post-doc at the Laboratoire des Technologies de la Microélectronique in Grenoble, France. Professor Gordon's research interests include scanning probe microscopy, plasma physics, plasmonics, spectroscopy, and nanomaterials. Mike is a Packard Fellow, received the NSF Career award, and was the Vaughn lecturer at Caltech in 2013. He has also received several department and campus-wide outstanding teaching awards.

RECEPTION 3:30 • LECTURE 4:00 - 5:00
PHYSICS ASTRONOMY BLDG. (PAA) A110



CHEMICAL ENGINEERING

UNIVERSITY of WASHINGTON

Knowledge and solutions for a changing world