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10:00am-11:00am

EGR BLDG 2 RM W122

ULTRA-FLAT AND ULTRA- SMALL: NEW APPROACHES TO NANOFABRICATION FOR PLASMONICS AND METAMATERIALS

Abstract:

This presentation will focus on two unconventional fabrication techniques: template stripping for making ultra-smooth patterned metals and atomic layer lithography for making ultra-small (< 10 nm) gaps with angstrom-scale control. In template stripping, instead of directly patterning noble metal films, which are difficult to plasma-etch, we create inverse patterns in a silicon template using mature IC processing techniques. After metal deposition and peeling, precisely patterned geometries in the silicon template is faithfully replicated onto a deposited metal film. To date, template stripping has been used to create ultra-smooth plasmonic gratings, nanoholes, pyramids, and wedges for applications including near-field optical microscopy, Raman spectroscopy, biosensing, and particle trapping. We are extending this technique via roller template stripping to create flexible, stretchable, and rollable plasmonic devices and metasurfaces.

Another emerging fabrication technique, called atomic layer lithography, has demonstrated wafer-scale production of ultra-long (> 1 mm) and ultra-small (< 1 nm) slits in metal films. The resulting slits and resonant loops show extremely high field enhancements via gap plasmons and tunable resonances at visible, infrared, and terahertz frequencies. We will describe broader applications of this powerful lithography technique.

Biography:

Sang-Hyun Oh obtained his B.S. in Physics from KAIST, Korea, and Ph.D. in Applied Physics from Stanford University. After postdoctoral research at Bell Laboratories, Murray Hill, and the University of California at Santa Barbara, he joined the ECE department at the University of Minnesota, Twin Cities in 2006. He is currently an Associate Professor of ECE and runs a lab focused on plasmonics, nanofabrication, and biosensing. He is a recipient of young faculty awards from the Office of Naval Research, DARPA, NSF, ACS and 3M. He was a visiting professor at Imperial College London and ETH Zurich in 2014.

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