SINAM NANO SEMINAR

Center for Scalable and Integrated Nano Manufacturing (SINAM) presents

SINAM
CENTER FOR SCALABLE AND INTEGRATED NANOMANUFACTURING

Squeezing Photons (and Sound) Into Matamaterials

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Dept of Mechanical Science and Engineering And The Center for Nanoscale Chemical-Electrical-Mechanical Manufacturing Systems
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Wednesday, April 2, 2008
11:00 AM - 12:00 PM
3110 Etcheverry Hall

Abstract

For conventional lenses, the image resolution is smeared at the scale of wavelength. This is because photons escaping from the sub-wavelength objects spread out rather than remaining confined in their original dimensions. However, this physical law of diffraction needs to be revisited for materials made of artificial “atoms” and “molecules” that offer extraordinary optical and acoustic properties. These metamaterials could have profound impact in a wide range of applications such as real-time imaging and manipulation at molecular scale.

In this talk, I will discuss the progress of making these artificial metamaterials for optical and acoustic imaging purposes. We demonstrated, for the first time, squeezing ultrasound through metamaterials made of sub-wavelength Helmholtz resonator arrays. Furthermore, using smooth silver as an optical superlens, we recently demonstrated imaging with 30nm resolution, or 1/12 of the illumination wavelength. These plasmonic structures indeed promise exciting avenues to highly compact nanoscale optical imaging and sensing devices.

Nicholas Xuanlai Fang is an assistant professor of Mechanical Science and Engineering at the University of Illinois at Urbana-Champaign. He received his PhD of Mechanical Engineering in February 2004 from the University of California-Los Angeles(UCLA), under Professor Xiang Zhang. He also holds MS (1998) and BS (1996) degrees in Physics from Nanjing University, China. Dr. Fang’s research highlight includes first demonstration of optical superlensing (listed by SCI as a fast breaking paper of physics in April 2006), invention of far IR magnetic/plasmonic metamaterials, and development of 3D micro/nanolithography systems. He is also interested in energy and mass transport phenomena in micro- and nanoscale systems. Dr Fang is the recipient of the ASME Pi Tau Sigma Gold Medal of 2006, in recognition of his outstanding achievement in mechanical engineering. He served as a symposium co-organizer of MRS spring 2006 meeting, with focus on optical negative index materials.

Refreshments Provided

Hosted By: Professor Xiang Zhang, 3112 Etcheverry Hall
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