Tsinghua University
Department of Physics

Physics Colloquium 2012 Fall

Optical Metamaterials: Negative Refraction, Superlens and Plasmon Lasers

Abstract

Recent theory predicted a new class of photonic composite materials that its properties are derived by the structure rather than chemical compositions which promise unprecedented electromagnetic properties that do not exist in the nature such as optical magnetism and negative refraction. Especially, superlens made of metamaterials breaks the fundamental diffraction limit, which may have profound impact in wide range of applications such as nano-scale photonics, electronics manufacturing, and biomedical imaging.

I'll discuss recent progress that demonstrated the intriguing physics. We created the first bulk optical metamaterials that show the negative refractions. We demonstrated the superlens and optical cloak using carefully design of plasmonic materials dispersions. Scaling down photonics beyond diffraction limit is a key to drive the exponential growth of information technology. I will discuss new strategies for truly nano-scale photonics including indefinite cavity, plasmonic waveguide and lasers --a coherent light at molecular scale. Finally I will present a 22nm superlens lithography technology that may transform the next generation of nano-manufacturing.

Speaker

Xiang Zhang is the Ernest S. Kuh Chaired Professor at University of California, Berkeley and the Director of NSF Nano-scale Science and Engineering Center (SINAM). He is a member of US National Academy of Engineering (NAE), Academia Sinica and fellow of APS, OSA, AAAS and SPIE. His group's research in optical metamaterials was selected by Times Magazine as "Top 10 Scientific Discoveries in 2008". He received his BS/MS in physics in Nanjing University, China, and Ph.D from UC Berkeley in 1996 and was on faculty at Pennsylvania State University and University of California, Los Angeles (UCLA) prior joining the Berkeley faculty in 2004.

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2012-10-09 16:00

Zheng Yu-Tong Lecture Hall, New Science Building

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http://www.phys.tsinghua.edu.cn/Colloquium/