STEVENS INSTITUTE of TECHNOLOGY
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University Seminar Series

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Nano-scale photonics with micron-scale light

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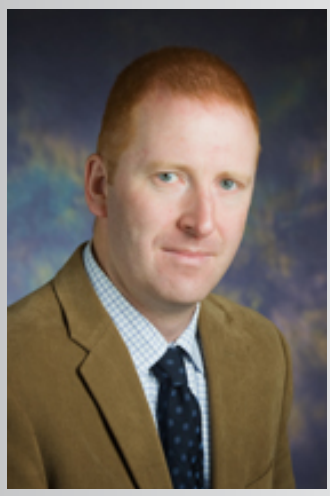
ABSTRACT The mid-infrared (mid-IR) spectral range (3-30μm) has become a burgeoning and dynamic field of research both for fundamental exploration as well as applied research in health and the environment, security and defense, communication, and sensing. At the same time, the areas of plasmonics and metamaterials have experienced explosive growth over the past decade, fueled in part by rapid developments in fabrication, characterization, computational science, and theory. Yet, the integration of plasmonic structures into mid-IR optical systems has been slower to evolve. While scaling metamaterial and plasmonic geometries to mid-IR wavelengths is fairly straightforward, replicating the near-IR and visible optical properties of constituent materials in plasmonic and metamaterial systems is less trivial, leading to very different behavior of scaled systems in these two wavelength ranges. Here I will discuss our group's recent work developing novel optoelectronic and plasmonic devices and structures for mid-IR applications. I will demonstrate the advantages and disadvantages of utilizing traditional plasmonic metals in mid-IR structures, and use this discussion to motivate our recent work with highly doped semiconductors as designer mid-IR metals for plasmonic, metamaterial, and epsilon-near-zero applications. In particular, I will focus on the promise of these new plasmonic materials for nano-scale confinement of micron-scale wavelengths, and for potential applications in nano-sensing and thermal emissivity control.

BIOGRAPHY Dan Wasserman is an Assistant Professor of Electrical and Computer Engineering at the University of Illinois, where his research focuses on plasmonic and metamaterial devices and structures, nanotechnology, and semiconductor-based material systems for the mid-IR wavelength range. Wasserman received his Sc.B. in 1998 from Brown University in Engineering/Physics and his PhD from the Department of Electrical Engineering at Princeton in 2004, where he was a Francis Upton Fellow and an NSF Graduate Fellow. Dr. Wasserman is the recipient of the NSF CAREER award, an AFOSR Young Investigator Award, and the 2010 Excellence in Teaching Award from the UMass Lowell Physics Department.



EVENT DETAILS

DATE:
March 26, 2014

TIME:
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Morton 103
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