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Optical Bulk Metamaterials

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Metamaterials are artificially designed subwavelength composites that possess extraordinary properties not existing in naturally occurring materials. In particular, they can alter the propagation of electromagnetic waves resulting in negative refraction, sub-wavelength focusing, and transmission of sub-wavelength information over a finite distance. Such unusual properties can be obtained by a careful design of the metal-dielectric composites on a deep sub-wavelength scale. The metamaterials may have profound impact in wide range of applications such as nano-scale imaging, nanolithography, and integrated nano photonics. I will discuss a few recent experiments demonstrating intriguing phenomena associated with Metamaterials. These include sub-diffraction limit imaging and focusing, low loss negative refraction and imaging in bulk optical metamaterials, and Negative-index Metamaterials (NIM) exhibiting negative phase propagation that can be accessed from free-space. I'll also discuss nano plasmonics for imaging and bio-sensing.