Abstract Submitted
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Negative Index Metamaterials for Superlenses Based on Metal-Dielectric Nanocomposites[1] LATIKA MENON, WENTAO LU, ADAM FRIEDMAN, STEVEN BENNETT, DONALD HEIMAN, SRINIVAS SRIDHAR, Northeastern University — Negative index metamaterials are demonstrated based on metal-dielectric nanocomposites. The nanocomposites are prepared using a versatile bottom-up nanofabrication approach involving the incorporation of vertically aligned metal nanowires such as Au and Ag inside dielectric aluminum oxide nanotemplates. Aluminum oxide nanotemplates with specific pore dimensions are fabricated by means of electrochemical anodization. Following this, Au/Ag nanowires with specific wire dimensions are electrodeposited inside the pores. Optical absorbance measurements show resonance peaks corresponding to transverse and longitudinal surface plasmon modes. Peak position and intensity are found to be strongly dependent on nanocomposite dimensions, filling factor (ratio of the volume of metal versus the volume of dielectric) and angle of incidence with respect to the wire axis. A quantitative model based on effective medium theory is in excellent agreement with experimental data, and points to specific composite configurations and wavelength regimes where such structures can have applications as negative refraction media for superlens imaging.

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