Abstract Submitted
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Tunable plasmonic negative index nanostructures and nanolenses in optical domain[1] E.V. PONIZOVSKAYA, A.M. BRATKOVSKY, Hewlett-Packard Labs, Palo Alto — We have designed by means with the use of FDTD method a metamaterial, which is a stack of metallic films with periodic hole arrays separated by dielectric layers (usually called fishnet, FN) to have negative index at IR frequencies. Optical modulation of the effective refractive properties of a FN Ag/Si/Ag metamaterial structure in the near-IR range has been confirmed experimentally [1]. Pump excitation of the amorphous Si layer was found to be responsible for the observed modulation of the effective refractive index [1]. We discuss the use of gain material to compensate the losses. Arrays of metallic nanoparticles or holes support individual and collective plasmonic excitations that contribute to surface enhanced Raman scattering (SERS), anomalous transparency, negative index, and subwavelength resolution in various metamaterials [2]. Using the FDTD and a boundary integral method we design 2D plasmonic nanolenses with thousandfold field enhancement factor that can be used for single-molecule SERS detection. [1] E. Kim, et al., Appl. Phys. Lett. 91, 173105 (2007) [2] E.V. Ponizovskaya, A.M.Bratkovsky, Appl.Phys. A 87, 161 (2007)

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