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Scattering properties of semiconductor-based metamaterials with subwavelength cavities in the infrared region ANDREY SEMICHAEVSKY, Lincoln University, PA, STEPHANIE LAW, University of Delaware — All-semiconductor (III-V) metamaterials for the IR have recently been proposed for applications in superlensing and sensing [1]. These 1-D structures have been shown to have negative effective refractive index at wavelengths around 8 μm. Some other metamaterial structures for the visible range [2] employed SiC spherical inclusions in a plasmonic (MgB_2) host medium. In this paper we develop and model IR metamaterials that utilize both low-loss highly doped GaAs/InAs semiconductor thin films and 3-D structures, such as subwavelength resonant cavities. We predict the light scattering by these structures using experimentally measured dispersion relations for the doped semiconductor films. The frequency dispersions of permittivity are well fitted by the Drude model. Our future work will include the fabrication of the metamaterial structures and their optical characterization.

[1] S. Law, C. Roberts, T. Kilpatrick, L. Yu, T. Ribaudo, E. A. Shaner, V. Podolskiy, and D. Wasserman, *Phys Rev. Letters*, **112**, 017401, 2014.
[2] A-G. Kussow, A. Akyurtlu, A. Semichaevsky, and N. Angkawisittpan, *Physical Review B,* ***76***, 195123, 2007.

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