

Abstract Submitted
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Negative Permittivity and Permeability Metamaterials of Polymer-based Nanocomposite¹ H. HAN, Department of Physics, University of Idaho, B. LI, School of Mechanical & Materials Engineering, Washing State University, Q. YAO, Department of Physics, University of Idaho, W.H. ZHONG, School of Mechanical & Materials Engineering, Washing State University, Y. QIANG, Department of Physics, University of Idaho — Metamaterials with negative permittivity and negative permeability are a novel class of artificial materials. For large scale, light weight and deformable applications, it is compelling to develop flexible polymeric metamaterials. Accordingly, double negative metamaterials are created by incorporating Fe/Fe₃O₄ core-shell magnetic nanoparticles (MNPs) and conductive carbon nanofillers into the polyetherimide matrices. Dielectric tests and transmission-line perturbation method detect the negative permittivity and the negative permeability of the nanocomposites, respectively. This is attributed to the interaction between MNPs, the nanofillers and the polymer. By adjusting the component structures, the frequency range of the negative permittivity or permeability can be controlled, which is promising for the development of left-handed metamaterials.

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H. Han
Physics Department, University of Idaho

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