

174

标题: New assembly route for three-dimensional metamaterials obtained through effective medium theory

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摘要: In this study, we illustrate the effective medium theories in the designs of three-dimensional composite metamaterials of both negative permittivity and negative permeability. The proposed metamaterial consists of random coated spheres with sizes smaller compared to the wavelength embedded in a dielectric host. Simple design rules and formulas following the effective medium models are numerically and analytically presented. We demonstrate that the revised Maxwell-Garnett effective medium theory enables us to design three-dimensional composite metamaterials through the assembly of coated spheres which are random and much smaller than the wavelength of the light. The proposed approach allows for the precise control of the permittivity and the permeability and guides a facile, flexible, and versatile way for the fabrication of composite metamaterials.

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