Optical Properties of Nanostructured Metamaterials

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The optical properties of different metamaterials composed of metallic nanoparticles are investigated from a theoretical point of view. We consider materials composed of layers of periodically disposed particles and analyze the anisotropic dielectric function of these systems as a function of frequency and layer spacing. The dielectric function is obtained by solving Maxwell's equations using a layer-KKR method and by comparing the reflectance of planar surfaces of such materials with Frenel's equations for different angles of incidence and polarizations of the incoming light. We will also discuss the role that the shape of the particles have in the dielectric function, comparing materialas composed of spherical and ellipsoidal particles.