

Abstract Submitted
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From Photonic Crystals to Photonic Metamaterials. II¹ FELIPE PEREZ-RODRIGUEZ, PETER HALEVI, INAOE — We have applied the mean-field theory (I) described in the preceding abstract to metallo-dielectric photonic crystals with cubic symmetry and for different forms of the metallic inclusions. In particular, we have calculated analytically the effective permittivity and permeability for periodic composites with “cages” of thin metallic wires or “3D crosses” and for arrays of small metallic or dielectric spheres in vacuum. We compare our results for the permittivity of such systems with former theories and find agreement as far as the real part is concerned. Our results for the imaginary part of the permittivity differ from other works and those for the permeability are new. In fact, the extinction coefficient that we derive for small metallic spheres is three orders of magnitude greater than the prediction of the Maxwell-Garnett theory. We are in the process of applying our theory to other interesting metallo-dielectric systems.

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