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Invisibility of a metamaterial without a cloak REED HODGES, MAXIM DURACH, Georgia Southern Univ — Invisibility is a major direction in metamaterial research and has been a great source of interest in photonics in recent years. The two primary methods to induce invisibility are transformation optics and plasmonic cloaking. Both of these methods have a well-defined separation of the invisible structure into the hidden and the cloak regions. Here we demonstrate that a solitary wavelength-sized metamaterial object can be designed to be invisible in such a way that it is impossible to define a hidden part and a cloak, since the object responds as homogeneous to light. We show that a radially anisotropic metamaterial sphere serves as an example of such homogeneous invisible object in the visible part of the spectrum and has negligible scattering and extinction normalized total cross-sections (<<1) for volumetric metal fractions on the order of 5% up to diameters of the sphere on the order of wavelength. For metaspheres with diameters on the order of 2 wavelengths the normalized cross-sections are highly-reduced (˜1) as compared to purely metal or dielectric spheres of the same geometrical dimensions (for which normalized cross-sections are ˜3-4).

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