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标题: A bottom-up approach to fabricate optical metamaterials by self-assembled metallic nanoparticles

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摘要: We introduce a novel bottom-up approach to fabricate by self assembly a metamaterial from metallic nanoparticles in a two-step process. In the first step, a metamaterial made of densely packed silver nanoparticles is required. The material dispersion with increasing nanoparticle densities, from dispersed to randomly packed nanoparticles, was measured by spectroscopic ellipsometry, demonstrating high permittivity values in the visible. In the second step, this material was used to prepare spherical clusters by a method based on oil-in-water emulsion. The optical properties of these clusters were equally investigated by spectroscopic means. Comparisons with rigorous numerical simulations clearly indicate that, depending on the cluster size, their spectral response can be unambiguously associated with the excitation of a magnetic dipole resonance. As a consequence, such spherical clusters are promising building blocks for future metamaterials possessing a magnetic response in the visible range. (C) 2012 Optical Society of America

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