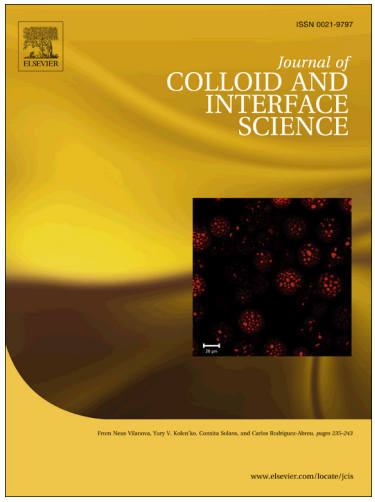

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Optimization and photomodification of extremely broadband optical response of plasmonic core-shell obscurants

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ABSTRACT

Plasmonic resonances of the metallic shells depend on their nanostructure and geometry of the core, which can be optimized for the broadband extinction normalized by mass. The fractal nanostructures can provide a broadband extinction. It allows as well for a laser photoburning of holes in the extinction spectra and consequently windows of transparency in a controlled manner. The studied core-shell microparticles synthesized using colloidal chemistry consist of gold fractal nanostructures grown on precipitated calcium carbonate (PCC) microparticles or silica (SiO_2) microspheres. The optimization includes different core sizes and shapes, and shell nanostructures. It shows that the rich surface of the PCC flakes is the best core for the fractal shells providing the highest mass normalized extinction over the extremely broad spectral range. The mass normalized extinction cross section up to 3 m^2/g has been demonstrated in the broad spectral range from the visible to mid-infrared. Essentially, the broadband response is a