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Solvent-Mediated Plasmon-Tuning in a Nanoparticle-Poly(Ionic Liquid) Organogels and Hydrogels MILLICENT FIRESTONE, DOLLY BATRA, SOENKE SEIFERT, Argonne National Laboroatory — The design, synthesis and characterization of hierarchically ordered composites whose structure and optical properties can be reversibly switched by adjustment of solvent conditions are described. Solvent-induced swelling and deswelling is shown to provide control over the internal packing arrangement and hence, optical properties of *in situ* synthesized metal nanoparticles. Specifically, metal nanoparticle-containing ionic liquid-derived polymers are synthesized in a single step by UV irradiation of a metal ion precursor-doped, self-assembled ionic liquids, 1-decyl-3-vinylimidazolium chloride or 1-(8-(acryloyloxy)octyl)-3-methylimidazolium chloride, physical gels. Small-angle X-ray scattering (SAXS) studies are used to monitor the nanostructure of the polymers in the deswollen and swollen states. Optical spectroscopy of the dried composites reveals plasmon resonances positioned in the near-infrared. Upon swelling in alcohol or water, the materials undergoes a structural conversion to a disordered structure, which is accompanied by a color change and a blue shift in the surface plasmon resonance. These results demonstrate the far-field tuning of the plasmonic spectrum of gold nanoparticles by solvent-mediated changes in its encapsulating matrix, offering a straightforward, low-cost strategy for the fabrication of nanophotonic materials.

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