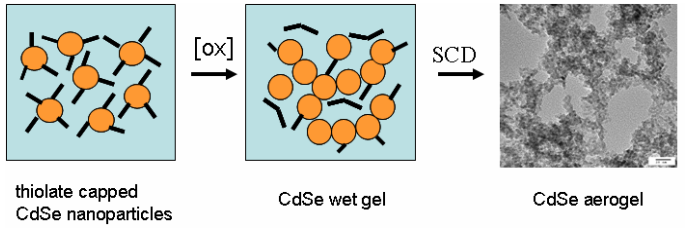
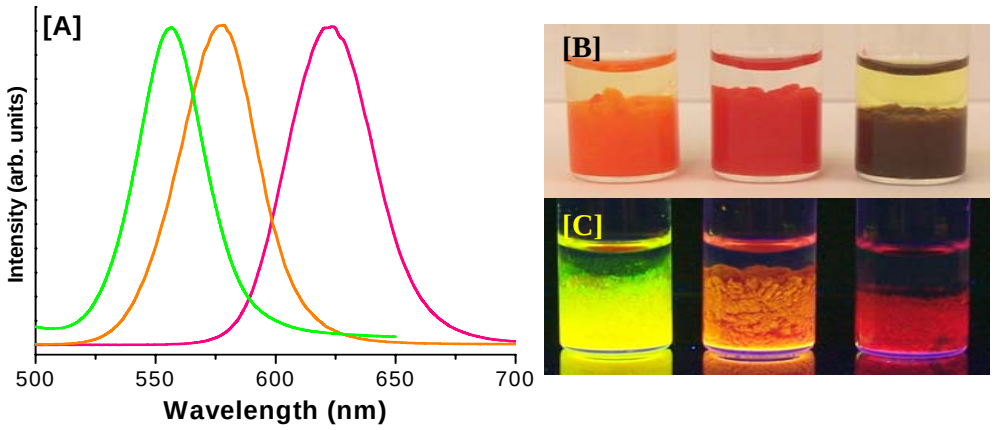
Development of a New Class of Porous Semiconductors with Photovoltaic, Sensing and Catalytic Activity: Chalcogenide Aerogels

Stephanie L. Brock, Department of Chemistry, Wayne State University, Detroit, Michigan 48202

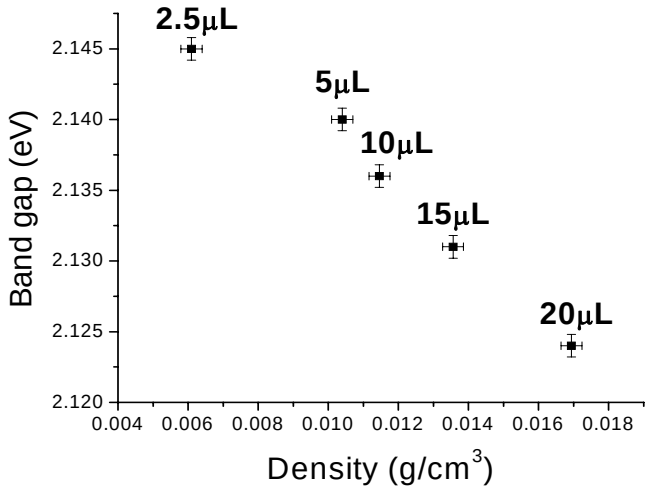
Semiconductor metal chalcogenide nanoparticles have been assembled into porous architectures (gels and aerogels) by sol-gel methods. Highly luminescent monoliths can be created from CdSe/ZnS core/shell particles with colors that vary depending on the CdSe core size. In "naked" CdSe systems, the optical properties also depend on the density of the network and the shape of the building blocks. Because the luminescence intensity depends on the surface ligands, CdSe aerogels are effective sensors for Lewis base analytes.



Synthesis of CdSe gels and aerogels



Highly luminescent monolithic gels of CdSe/ZnS core/shell particles



Effect of density on bandgap (quantum confinement) in fractal architectures (CdSe aerogels)