

85b Noble Metal Seeded Growth of Anisotropic CdSe Nanocrystals [Invited]

Ken-Tye Yong, Yudhishira Sahoo, Mark T. Swihart, and Paras N. Prasad

A method is presented for preparing CdSe quantum rods, bipods, tripods and tetrapods by catalytic seeding with gold (Au), silver (Ag), palladium (Pd) or platinum (Pt) nanoparticles, without using the typical combination of trioctylphosphine oxide (TOPO) and a phosphonic acid or making multiple additions of precursors. The Au, Ag, and Pd nanoparticles were synthesized using a two-phase method. The Pt nanoparticles were prepared through a hot colloidal synthesis method. The Au, Ag, Pd and Pt nanoparticles all formed stable colloidal dispersions in organic media and served as catalysts to aid the anisotropic growth of CdSe nanocrystals from CdO and elemental selenium dissolved in organic media. The CdSe nanocrystals were characterized using transmission electron microscopy (TEM), high-resolution transmission electron microscopy (HRTEM), X-ray Diffraction (XRD), photoluminescence (PL) and UV-vis spectroscopy. The different anisotropic shapes of CdSe nanocrystals were obtained at different reaction times. The CdSe nanocrystals grow along the c-axis of the hexagonal wurtzite structure. The aspect ratio of synthesized CdSe quantum rods ranges from 5 to 12 depending on the metallic nanoparticles used. Under the same reaction conditions, but in the absence of the metal nanoparticles, only spherical CdSe nanocrystals were formed.