

Anisotropic Shape and Optical Properties of Cadmium-Free Branched Core/Shell Nano-Heterostructures

고성준, 이도창[†]

KAIST

(dclee@kaist.edu[†])

Colloidal semiconductor nanocrystals (NCs) are one of the most promising materials as polarized photon absorbers and emitters. The optically anisotropic features of NCs can result from the anisotropic shape. However, the ability to control NC shape and anisotropic optical properties has been limited to toxic Cd-based materials, *e.g.*, CdE (E = S, Se, Te) nanorods and nanoplatelets. Here, we report the synthesis of environmentally friendly heterostructured core/shell NCs, *i.e.*, ZnSe/ZnS, InP/ZnS and InAs/ZnS multipods (MPs). The MPs show polarized absorption and emission across a wide range of wavelength from ultraviolet to near-infrared. A statistical analysis based on transmission electron microscopy and small-angle X-ray scattering reveals that InP/ZnS MPs have shape anisotropy in terms of the difference in diameters of ZnS arms in a particle. This difference results in the asymmetric wavefunction delocalization of electrons, which eventually leads to the fluorescence polarization.