

Anisotropic Shape and Optical Properties of Cadmium-Free Colloidal Branched Nano-Heterostructures

고성준, 이도창<sup>†</sup>

KAIST

(dclee@kaist.edu<sup>†</sup>)

We report the linearly polarized photon absorption and emission from the branched core/shell NCs (BNCs) comprising relatively nontoxic elements, e.g., ZnSe/ZnS, InP/ZnS and InAs/ZnS. With the change in the core size and composition, the linearly polarized absorption and emission by BNCs span across the energy range from ultraviolet to near-infrared. Small-angle X-ray scattering analysis reveals that InP/ZnS BNCs exhibit the broken symmetry in shape resulted from the intraparticle ripening to minimize the surface energy. The geometric asymmetry of BNCs leads to the asymmetric delocalization of electron wavefunction and directed emission. In addition, the permanent dipole moment of BNCs interacts with the external electric field and induces the uniaxial alignment of BNCs. This work sheds light on the utilization of optically anisotropic NCs in practical applications which essentially demand the low toxicity of materials.