

Optoelectronic Applications of Colloidal Tetrapod Semiconductor Nanocrystals

Kookheon Char*

National Creative Research Initiative Center for Intelligent Hybrids, School of Chemical & Biological Engineering, Seoul National University
(khchar@plaza.snu.ac.kr*)

In this presentation, we emphasize the utilization of well-defined tetrapod CdSe semiconductor NCs for transistors and solar cells applications. Colloidal tetrapod CdSe NCs with tunable arm length (30 ~ 90 nm) were prepared via the continuous precursor injection (CPI) methods with excellent shape selectivity. Beakwater-like networks of CdSe NCs were then formed by spin-coating the colloidal dispersions of tetrapod NCs. The porous nature of the NC networks allowed hybridizing the networks with other functional materials. The infusion of poly(3-hexylthiophene) (P3HT) into the CdSe networks formed pn-organic/inorganic hybrid bulk heterojunctions, resulting in solar cells with a power conversion efficiency up to 2.2%. Also, the introduction of ionic liquids into the networks enabled modulating the conductivity and mobility of the networks through the electrochemical gating process. We believe that the utilization of tetrapod-structured NCs provides new strategies to realize low-cost and flexible electronics.