Colloidal Growth and Self-Assembled Structures of Semiconductor Nanorods

김다흰, 이도창†
KAIST
(dclee@kaist.ac.kr†)

Semiconductor nanorods (NRs) are of particular interest in the field of nanomaterials and nanotechnology because of their unique properties including linearly polarized emission and effective charge transport along their long axis. To capitalize on shape- and structure-dependent properties of NRs, high-precision control and exquisite design of their growth are desired. Nevertheless, the mechanism behind the axial growth of NR still remains unclear. In this study, we unveil the NR growth mechanism. When NRs are introduced in application devices, asymmetry and directionality of the ensemble of NRs are closely related to collective properties. End-to-end network of NRs offers the most effective pathway for carrier transport, thereby serving as continuous electrical channels without impairing intrinsic properties of NRs. On the other hand, to display linearly polarized emission from NR ensemble, NRs should be assembled into smectic phase with side-by-side and end-to-end alignments. In this study, we present a 2-dimensional network through end-to-end linking of NRs for electrical pathway and smectic phase self-assembled structure of NRs for polarized light emission.