

Effect of Solvent Polarity on Formation of Vortex in Colloidal CdS Nanorod Superlattices and Their Optical Property

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In this presentation, we examined self-assembly of CdS NRs suspended in solution with designed polarity and vapor pressure. It turned out that the nanoscale interaction of CdS NRs could be tailored by hydrophobic attraction using the solvent with rather high polarity index. From the results, we observed that the change of hydrophobic attraction affected the inter-NR distance in hexagonally-packed NR clusters, which was experimentally verified in the small-angle X-ray scattering analysis on solution samples. During the evaporation process for sampling, the CdS NR clusters resulted in vortex formation or disclination, so as to minimize the interface energy due to capillary force between neighboring CdS NRs. We also report time-resolved photoluminescence properties on CdS NRs superlattices using PL lifetime imaging microscopy at a single particle level. PL lifetime imaging technique clearly reveals that different shaped CdS NRs clusters have different time-resolved PL characteristics.