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Self assembly and optical properties of CdSe nanoplatelet superlattice YUNAN GAO, WILLIAM TISDALE, MIT, TISDALE LAB MIT TEAM — Colloidal CdSe nanoplatelets (NPs) are 1-D confined materials with atomic uniform thickness, and only have homogeneous broadening in energy level distributions and very narrow emission spectrum. Additionally, NPs have a giant oscillator strength that leads to a faster emission rate compared to quantum dots and rods. Due to these properties, NPs have shown promising potential applications in light-emitting diodes, colloidal lasers, and harvesting multiple exciton generation in photovoltaic cells.

Self-assembly of superlattice has been studied broadly for many nano-particles, but not yet for CdSe NPs. We will show for the first time a selective control of CdSe NP superlattice self-assembly, i.e., self-assembled into columnar or lamellar superlattice. Moreover, we will present that the assembly morphology of superlattice has direct effects on their optical properties, like polarization, absorption efficiency and emission rate, etc., and also on their Forster energy transfer properties. The self-assembly is based on liquid interfacial self-assembly and transfer technique. The structure and propertied of the superlattice are characterized by transmission electron microscopy, and time-, polarization- and space-resolved photo-luminescent micro-spectroscopy.

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