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Energy Transfer in CdSe Nanoplatelet Supperlatices

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ABSTRACT

Two-dimension CdSe semiconductor nanoplatelets (NPLs) exhibit unique, highly desirable optical and electronic properties, such as large absorption crossection and bright emission. Förster resonance energy transfer (FRET) between NPLs is responsible for the utility of these NPLs in fields such as lasing, lighting, solar energy, and sensing. Here we study energy transfer processes in NPL superlattices using photoluminescence (PL) and time resolved PL (TRPL) spectroscopic methods. Information on the effect of thickness of NPL is obtained through correlating PL and TRPL spectra of CdSe superlattices with AFM measurements. PL spectrum showed narrow fluorescence and absorption peaks at room temperature corresponding to excitonic transitions. A FRET lifetime of 351 ps was observed. Results suggest that FRET occurs more rapidly in CdSe NPL superlattices than in isolated CdSe NPLs and that FRET lifetimes depend on available energy pathways in the surrounding environment. This is a promising new material in the field of semiconductors and optical applications.

KEYWORDS

Exciton dynamics, energy transfer, photoluminescence, two-dimension energy transfer, semiconductors