

Cd-to-Zn cation exchange of semiconductor nanocrystals by controlling binding strength between cation and ligand

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Semiconductor nanocrystals, also known as quantum dots (QDs), have attracted considerable interest because of their unique optical and electronic properties depending on size and shape. Heterostructuring of nanocrystals by introducing new composition and geometries brings chance to enhance the properties. Cation exchange is promising method for controlling the composition and making heterostructured QDs. To induce the cation exchange reaction in nanocrystals, controlling the binding between host, guest cations and ligands is important. In this study, CdZnSe heterostructured QDs are synthesized by Cd-to-Zn cation exchange in CdSe based QDs. By controlling the binding strength between Zn cation and ligand, we successfully induce the Cd-to-Zn direct cation exchange in QDs. Also, this method can be expanded to other morphologies, 1D nanorods and 2D nanoplatelets, to make new type of heterostructure.