

Facet control of colloidal CdSe nanoplatelets and its implications

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Colloidal CdSe nanoplatelets (NPLs) with atomically flat structure have unique optical properties such as ultra-narrow emission bandwidth, polarized emission and fast radiative transition. By virtue of advances in the colloidal synthesis, now the morphology of NPLs could be controlled from square to rectangle by adjusting the amount of acetate hydrate (or hydroxide) without changing the thickness. It is noteworthy that the shape anisotropy of NPLs is controllable despite the isotropic crystallinity (zinc blende). Also, controlling shape anisotropy could further enhance the polarized emission and affect self-assembly behavior of NPLs. In this study, we investigated the effect of hydroxide anion on the lateral growth of NPLs based on experimental and theoretical analysis. We observed that different side facets are developed depending on experimental conditions and lead morphological changes in NPLs. Reactivity difference of side facets alters growth rate and also leads additional behavior such as selective metal growth. Based on the results, we suggest lateral growth control mechanism of NPLs and implications of facet control on morphology and properties.