

Facile Synthesis of Ultrathin PbSe Nanoplates

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The use of two-dimensional (2D) semiconductor quantum wells may improve device performance in applications such as photodetectors, photodiodes, and photovoltaics. In the 2D structures, electrons and holes are confined in thickness dimension while their mobilities remain relatively intact as the confinement is relaxed in 2D spaces. However, formation of 2D nanostructures of PbSe or PbS stands counterintuitive as they have isotropic, cubic crystal symmetry. To our surprise, a simple tweak in reaction parameters, that is, ratio between surfactant molecules and PbSe, resulted in the formation of PbSe nanoplates with thickness as small as 4 nm. In this presentation, we discuss the effects of oleic acid (OA)-lead (Pb) ratio, and precursor injection method, in the morphology of the reaction product. Structural and optical properties of the PbSe nanoplates are also discussed.