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Formation and Dispersion of Organometal Halide Perovskite

Nanocrystals in Various Solvents

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Abstract

The solvent-induced precipitation in a mixture of good and poor solvents was often used to synthesize organometal halide perovskite nanocrystals (OMHP NCs). Here we investigate the formation of OMHP NCs by using HBr based precursors in various solvents. Various emission colors and morphologies of perovskite NCs were obtained depending on the solvents used. The nanoplatelets with blue emission were produced for the low polar solvents, such as toluene, PhCl and EtOAc. The increase in polarity of poor solvents results in the red shift of emission of obtained NCs. The much more polar solvents like acetone and CH₃CN lead to formation of CH₃NH₃PbBr₃ NCs (MaPbBr₃) with cubic phase. The dispersion behaviors of MaPbBr₃ NCs in different solvents was also investigated. MaPbBr₃ NCs can exist stably in most unpolar solvents. However, they will be dissolved in polar solvents, like acetone and acetonitrile, to give rise to a clear solution with red emission of Pb²⁺. By injecting this clear solution to unpolar solvents, OMHP NCs can be reproduced.

Keywords

Organometal halide perovskite; nanocrystals; photoluminescence; solvent-induced; emission

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