Organic Amphiphile as a Surface Ligand for Stable Caesium Lead Bromide Nanocrystals

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Lead halide perovskite nanocrystals (NCs) have drawn a great attention in the recent years due to their outstanding properties which makes it suitable for various optoelectronic applications such as photodetectors, light emitting diodes and photovoltaics.1 Here, we have synthesized and implemented a surface ligand for the surface treatment and colloidal stability of CsPbBr3 NCs. The synthesis of the ligand is performed via the nucleophilic substitution reaction to obtain the pure ligand, which is subsequently engaged for stable and brightly luminescent CsPbBr3 nanocrystal synthesis using the post-synthesis ligand exchange technique at room temperature.2 This results in the perovskite NCs with > 90% photoluminescence quantum yield (PLQY), along with improved colloidal stability at ambient conditions for a period of four months.2 In addition, we have fabricated the perovskite LEDs based on the new ligand treated CsPbBr3 nanocrystals that exhibits maximum external quantum efficiencies of (EQE) of 17%.3 The surface treatment with the newly synthesized ligand shows an effective way to produce high quality and stable perovskite nanocrystals for optoelectronic applications.