

Circularly polarized luminescence from colloidal perovskite nanocrystals

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Colloidal metal halide perovskite nanocrystals (NCs) with chiral ligands are outstanding candidates as a circularly polarized luminescence (CPL) light source. However, achieving pronounced and controllable polarized light emission remains challenging. Here, we develop strategies to achieve high CPL responses from colloidal formamidinium lead bromide (FAPbBr₃) NCs at room temperature using chiral surface ligands. First, we show that replacing a portion of typical ligands (oleylamine) with short chiral ligands ((R)-2-octylamine) during FAPbBr₃ NC synthesis results in small and monodisperse NCs which yield high CPL with average luminescence dissymmetry g-factor, $g_{\text{lum}} = 6.8 \times 10^{-2}$. Then, we also develop a post-synthetic ligand treatment using a different chiral ligand, (R-/S-)methylbenzylammonium bromide, which also induces a CPL with an average $g_{\text{lum}} = \pm 1.18 \times 10^{-2}$. Our demonstrations of high CPL and g_{lum} from both as-synthesized and purified perovskite NCs at room temperature suggest a route to demonstrate colloidal NC based spintronics