Organic Host Dispersion of Perovskite Nanocrystals via Aromatic Ligand Substitution

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Metal halide perovskite nanocrystals (NCs) have recently attracted much attention for use in light-emitting devices (LEDs), given their high color purity and narrow full width at half maximum (FWHM) over the entire visible-wavelength range.[1-6] The surface ligands of perovskite NCs capped with long alkyl chains play an important role in controlling the particle size during the synthesis and in achieving high colloidal stability in non-polar solvents. However, the long alkyl ligands, such as oleic acid (OA) and oleylamine (OAm), are generally insulating and thus reduce the electrical conductivity of the perovskite NC film, that is, the charge carrier injection and transport property, resulting in a higher driving voltage of the LEDs. Here, we demonstrate the aromatic ligand exchange of perovskite NCs to improve dispersibility in host organic materials. The aromatic ligand perovskite NCs enabled to form high quality composite film with small molecule host materials. The aromatic ligand NCs and small molecule host material composite achieved high photostability and operational device lifetime simultaneously.

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