

All Inorganic Lead Halide Perovskite/Siloxane Composite Film for Highly Stable Photoluminescence Quantum Yield

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All inorganic perovskite nanocrystals (PeNCs) have been investigated because of their outstanding optical properties, such as high quantum efficiency, narrow bandwidth, and tunable wavelength. However, low stability of the material limits further applications. We address this issue with introducing siloxane matrix that could make composite film exceptionally stable against oxidation under heat and moisture. PeNCs/siloxane film was prepared by sol-gel condensation reaction of silane precursors with PeNCs blended in the precursor solution. We prepared ligand-exchanged PeNCs to enhance the interaction with siloxane precursors. With ligand-exchanged PeNCs/Siloxane film exhibits stable emission intensity for over 1 months in elevated temperature and humidity. PeNCs were uniformly dispersed in the siloxane matrix and the film maintained high photoluminescence (PL) quantum yield (QY) under harsh conditions; for example, 85 °C/5 % relative humidity (RH), 85 °C/85% RH, in polar solvent, acidic and basic environments for 1 months. With this matrix, we envision perovskite display applications with high PL stability.