

Supporting Information: Surface *versus* Bulk State Transitions in Inkjet Printed All-Inorganic Perovskite Quantum Dot Films

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NOTE: Below are transmission electron microscopy images indicating particle size of the CsPbBr₃ nanoparticles and additional figures illustrating the X-ray photoemission (XPS) core level features for the printed CsPbBr_{2.4}I_{0.6} nanoparticle textured thin films, through both direct mixing of nanoparticles in solution. There is also photoluminescence spectroscopy data for the thicker bi-layer printed CsPbBr₃/CsPbI₃ quantum dot thin films and the time dependent alloying of CsPbBr_{3-x}I_x quantum dot solutions. These data were taken at room temperature. TEM was performed on a JEOL JEM-2100 scanning transmission electron microscope at an accelerating voltage of 200kV. XPS was performed with a SPECS Phoibos 150 hemispherical analyzer using non-monochromatized Al-K α X-ray radiation and a pass energy of 15 eV in an ultra-high vacuum chamber with a chamber pressure better than 5.0 \times 10⁻¹⁰ mbar. The photoluminescent spectroscopy was measured using an Ocean Optics DH-2000-BAL Deuterium-Halogen light source equipped with an Ocean Optics HR4000CG-UV-NIR high resolution spectrometer.

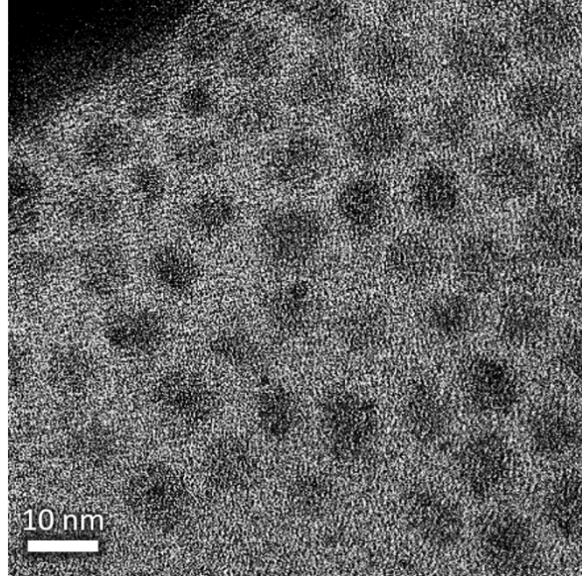


Figure S1: TEM image of the CsPbBr_3 quantum dots with average size of 7.3 nm.

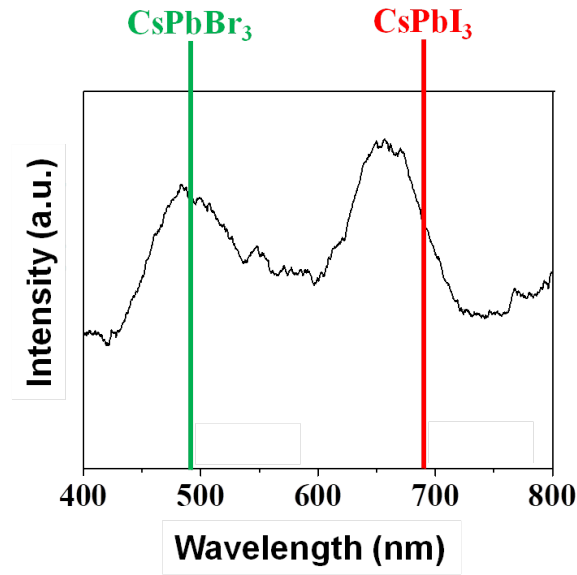


Figure S2: Photoluminescence of the bi-layer $\text{CsPbBr}_3/\text{CsPbI}_3$ quantum dot printed thin film, the presence of two separate peaks located at roughly 490 nm and 650 nm suggests the presence of segregated CsPbBr_3 (green line) and CsPbI_3 (red line), thus confirming the bi-layer printing method results in unmixed layers of $\text{CsPbBr}_3/\text{CsPbI}_3$.

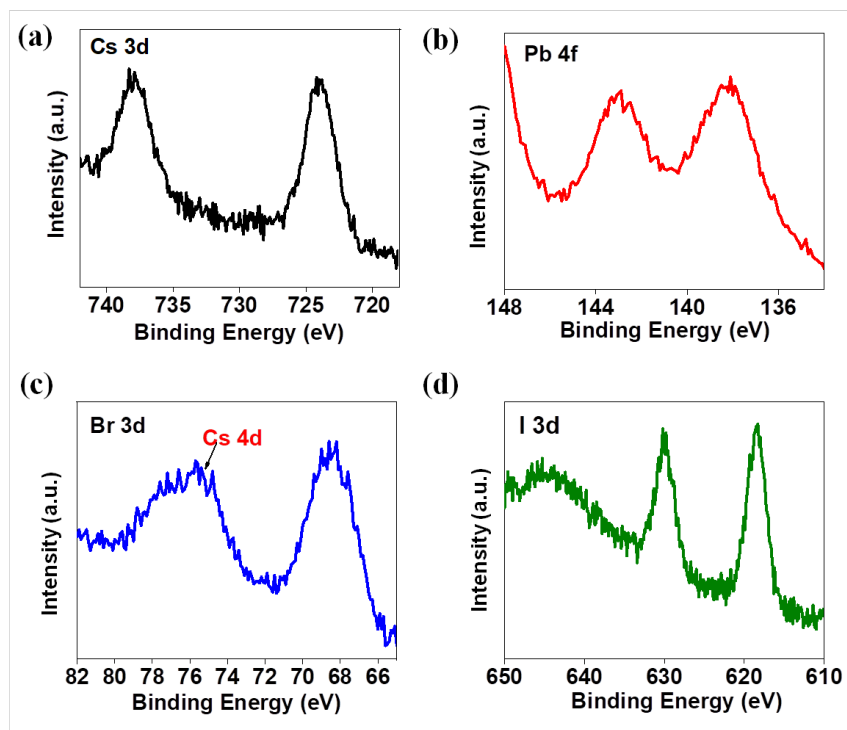


Figure S3: X-ray photoelectron spectroscopy of (a) the Cs 3d core level peaks, (b) Pb 4f core level peaks, and (c) the Br 3d core level peaks and Cs 4d core level peaks and (d) the I 3d core level peaks for the direct mixed perovskite $\text{CsPbBr}_{2.4}\text{I}_{0.6}$ quantum dot printed thin films.

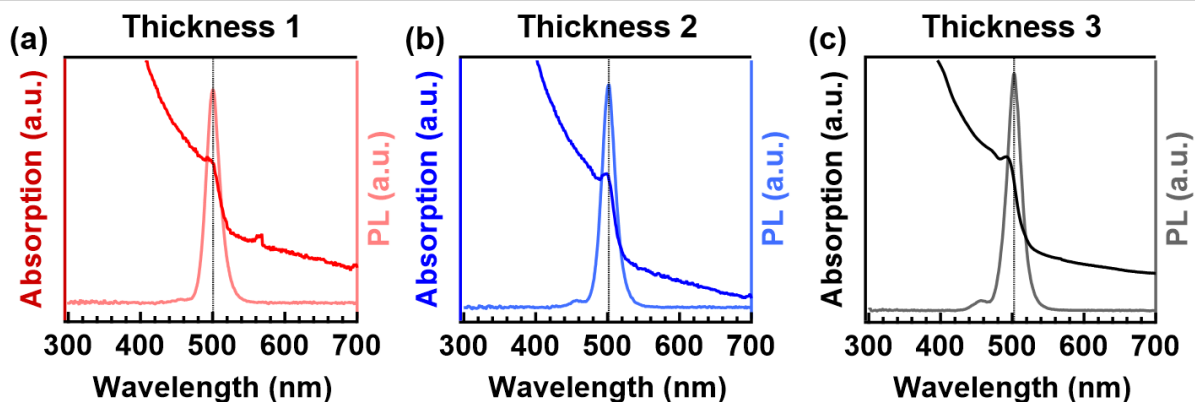


Figure S4: Optical absorption and photoluminescence profiles for CsPbBr_3 films, printed with single-layer printing method, of (a) thickness 1, (b) thickness 2, and (c) thickness 3. The vertical dashed line indicates the position of the PL peak.