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In situ study of superlattice self-assembly during slot-die coating of perovskite quantum dot films for solar cell applications

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Research into quantum dots (QDs) of metal halide perovskites has become increasingly popular due to their stability and tunable optoelectronic properties. Their controllable surface chemistry and simple preparation make them a promising alternative to bulk perovskite solar cells. The power conversion efficiency (PCE) of $Cs_xFA_{1-x}PbI_3$ QD solar cells (QDSCs) has been steadily rising, up to a recent record efficiency surpassing 16%. However, the orientation and self-assembly of the colloidal precursor into a superstructure is not yet well-understood. In this work, we study the formation of perovskite QD films using in situ grazing-incidence X-ray scattering (GIXS), to achieve a better understanding of the kinetics involved in their fabrication.

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