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Perovskite Nanocrystal Nucleation Seeds for Improved Microstructure and Faster Crystallization in Organic-Inorganic Halide Perovskite Thin Films

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Organic-inorganic halide perovskites have gained a huge interest in the scientific community owing to their favorable optoelectronic properties combined with their ease of production and abundance of raw materials. In many cases, polycrystalline thin films are fabricated for which thin film crystallinity and morphology are key factors affecting the perovskite properties. In this work, we present a novel approach for improving the thin film quality by employing external perovskite nanocrystals as seeds in slot-die coated formamidinium lead iodide thin films. Grazing incidence wide angle X-ray scattering (GIWAXS) and in-situ optical spectroscopy measurements show that the seed crystals improve the thin film texture by inducing a preferred crystallite orientation. Furthermore, we reveal a new crystallization pathway in seeded thin films with respect to unseeded ones via in-situ GIWAXS measurements.

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