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In situ GIWAXS investigations of slot-die coated perovskite thin-film materials

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Slot-die coating is a versatile and roll-to-roll compatible deposition technique that aims to lower production costs for thin-film-based perovskite solar cells. Our custom-built slot-die coater offers advanced morphology control capabilities and is compatible with in situ GISAXS/GIWAXS (grazing-incidence small/wide-angle X-ray scattering) and photoluminescence measurements [1]. Morphology control of the absorber material is crucial for high performance and reliable product quality. GISAXS/GIWAXS are a powerful combination to investigate the morphology and structure of thin films [2]. Here, we report on the time-resolved phase and quantitative texture evolution during the annealing and printing process of bulk MAPbI3 [3]. Different ordering appears for bulk perovskite depending on the deposition technique (spin-cast vs slot-die coated). We also report on the successful printing of CsFAPbI3 QDs for solar cell applications and report on well-working devices that show the advanced possibilities with pre-deposition crystallized materials.

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