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Tailoring optoelectronic properties of mixed halide perovskites via the versatile 2-Step deposition method

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Recently organic lead mixed-halide perovskite based solar cells surpassed a power conversion efficiency of 22 %. In particular the unique properties of perovskites, e.g. the highly tunable chemical composition, allow optimizing the hybrid crystal structure in a way to meet the desired demands. To take full advantage of this tunability of the perovskite materials, we apply a 2-step deposition technique to fabricate thin films. Those films of different chemical compositions and concentrations are probed with spectroscopic measurements. To get insights in their morphological and crystalline structure, these measurements are complemented by grazing incidence small- and especially wide-angle X-ray scattering. Especially the latter technique yields statistically relevant information about the crystalline features in the perovskite film, which enables us to relate optoelectronical to morphological characteristics. This offers the possibility to systematically tune the unique optoelectronic properties in order to achieve highly tailored high-quality perovskite thin films for a broad range of promising applications.

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