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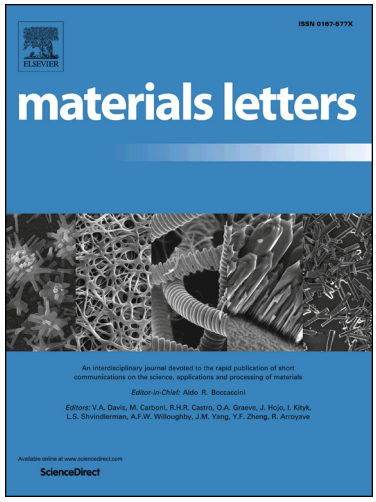

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Influence of air degradation on morphology, crystal size and mechanical hardness of perovskite film

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Abstract

Hybrid halide perovskite is attracting attention as an alternative solar cell material, but the air instability of perovskite is still a major research problem. The current work investigates how air degradation affects the crystal size, surface morphology, and mechanical hardness of the perovskite. Interestingly, we found that the crystal sizes of perovskite, PbI_2 and I_2 extracted from XRD measurements exhibited a dynamic variation with exposure to air. Particularly, it was found that the elastic modulus and hardness of the perovskite films increased for a 20 hr exposure to air and then gradually decreased due to chemical decomposition and formation of pinholes in the perovskite film.

Keywords: perovskites; degradation; elastic modulus; hardness; crystal size