

Supporting Information for

Shaping Perovskites: In-Situ Crystallisation Mechanism of Rapid-Thermally Annealed, Pre-Patterned Perovskite Films

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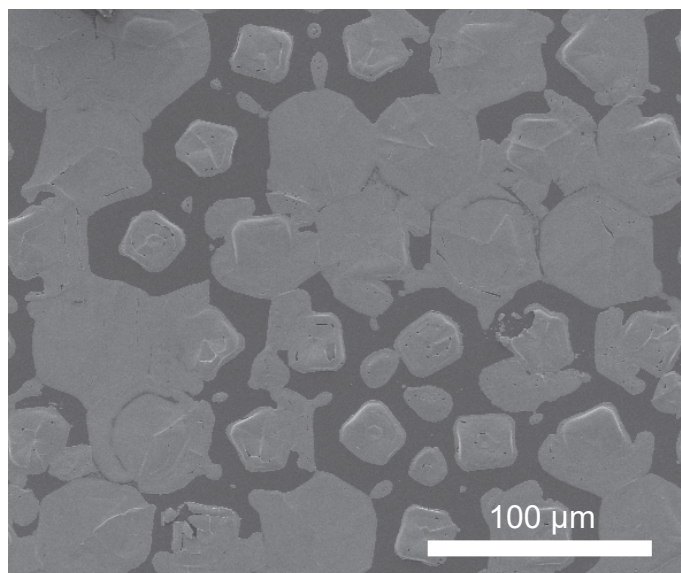


Fig. S1: FIRA annealed MAPbBr₃ film on a Si substrate with a patterned Au seed array with a 50 μm pitch size.

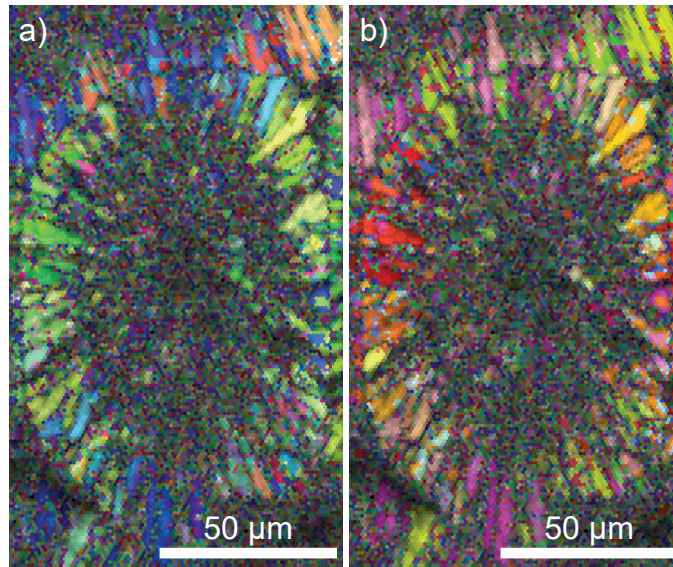


Fig. S2: Electron backscattering diffraction (EBSD) map indicating the crystallographic orientations in a) x -direction and b) y -direction.

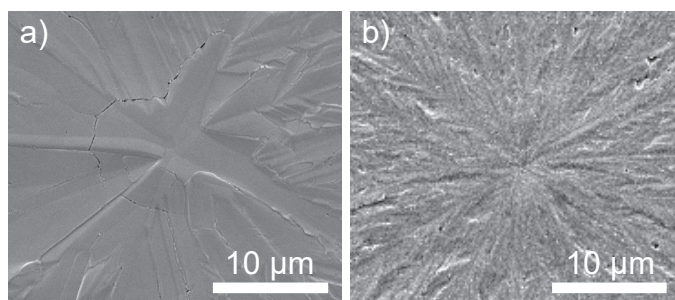


Fig. S3: a) SEM image of the domain centre of an Au seeded FIRA annealed domain within a 50 μm pitch pattern. b) SEM image of the domain centre of a spontaneously nucleated FIRA annealed domain.

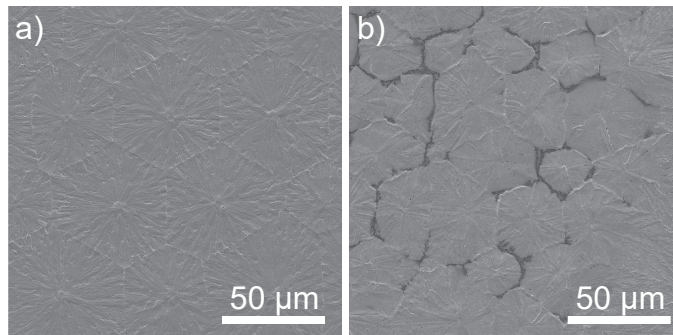


Fig. S4: FIRA annealed Platinum (a) and copper (b) seeded MAPbI₃ films. While silver (Ag) may seem like an obvious further candidate to study perovskite nucleation, the plasma etching step (see Methods section) to prepare the substrates would lead to the immediate oxidation of the Ag patches.

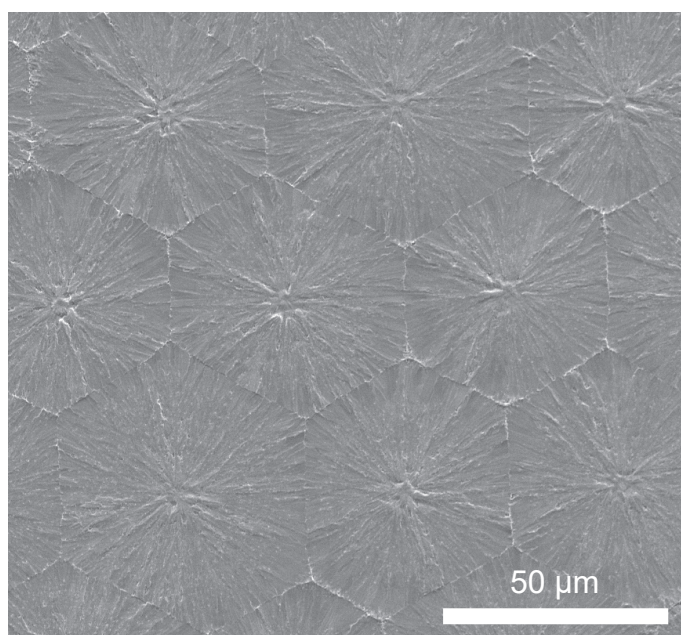


Fig. S5: SEM image of the final film morphology of the spin-coated MAPbI₃ film depicted in Figure 4f-j.

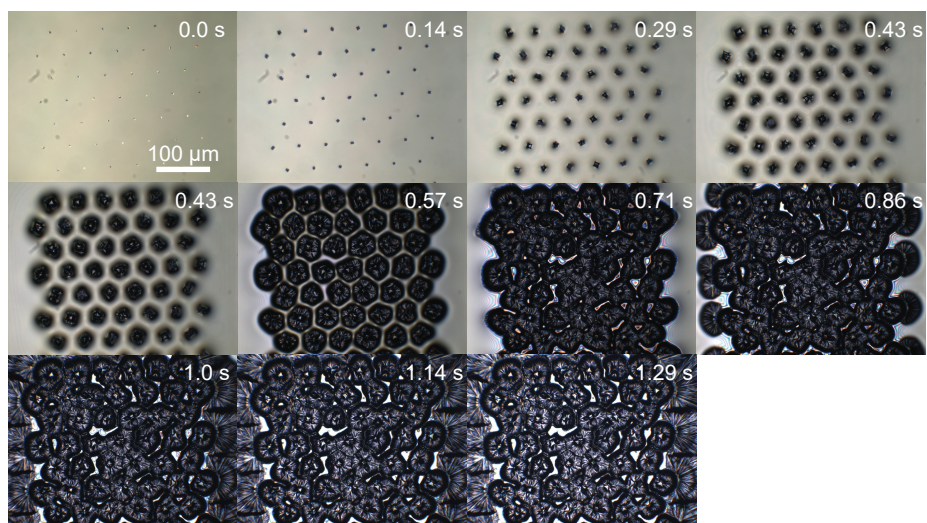


Fig. S6: In-situ optical microscopy images of nucleation and crystal growth stages of the $\text{Cs}_{0.15}\text{FA}_{0.85}\text{PbI}_3$ perovskite. The materials was drop-cast from a precursor solution onto an Au-patterned Si substrate, which was kept at a constant temperature of 150 °C. This composition is typically annealed at higher temperatures than the other perovskites pf this study, hence the relatively higher temperature chosen for the in-situ observation.

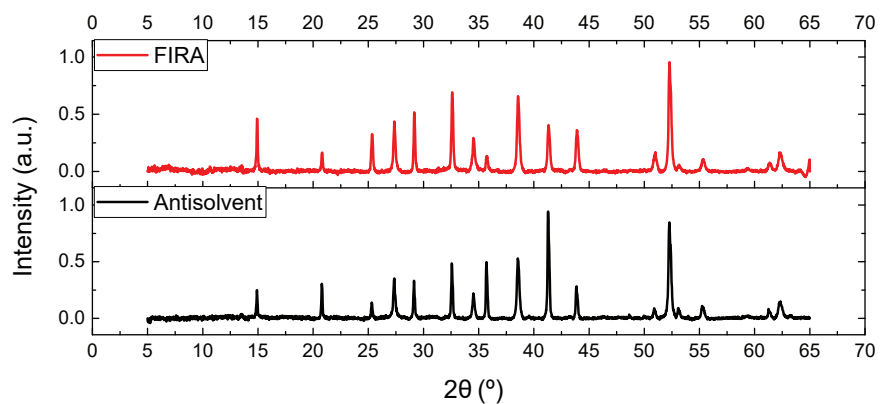


Fig. S7: XRD measurements of triple cation perovskite films annealed with the FIRA method (top) and the classic antisolvent method (bottom).

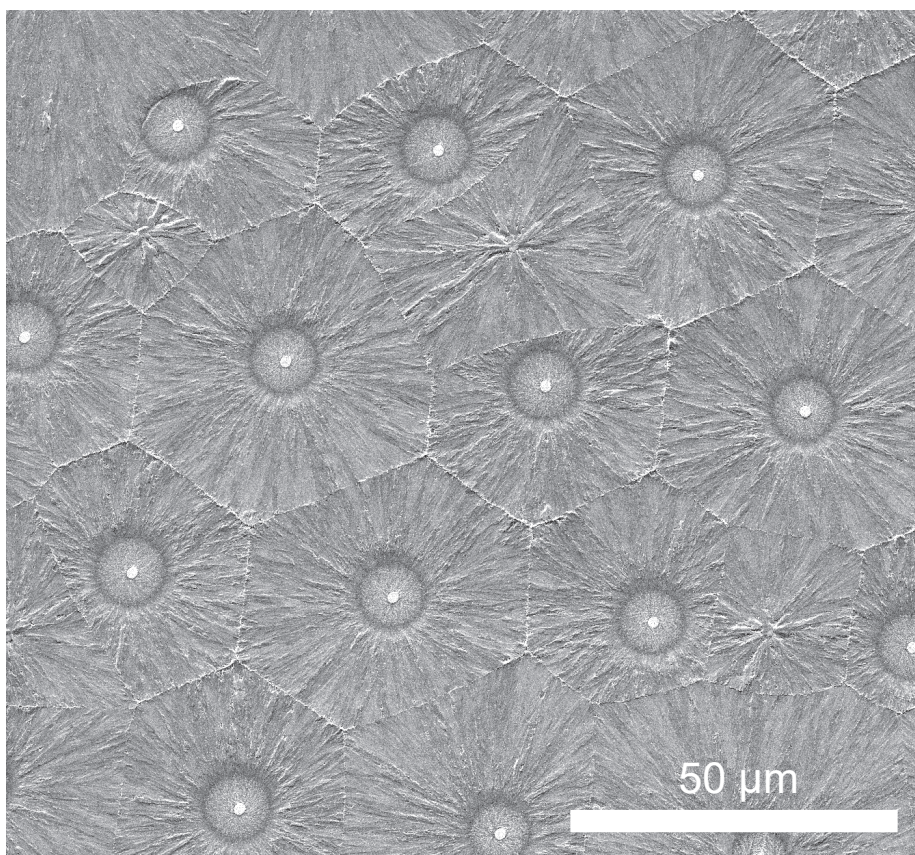


Fig. S8: FIRA annealed MAPbI_3 film on an ITO substrate with a patterned Au seed array.

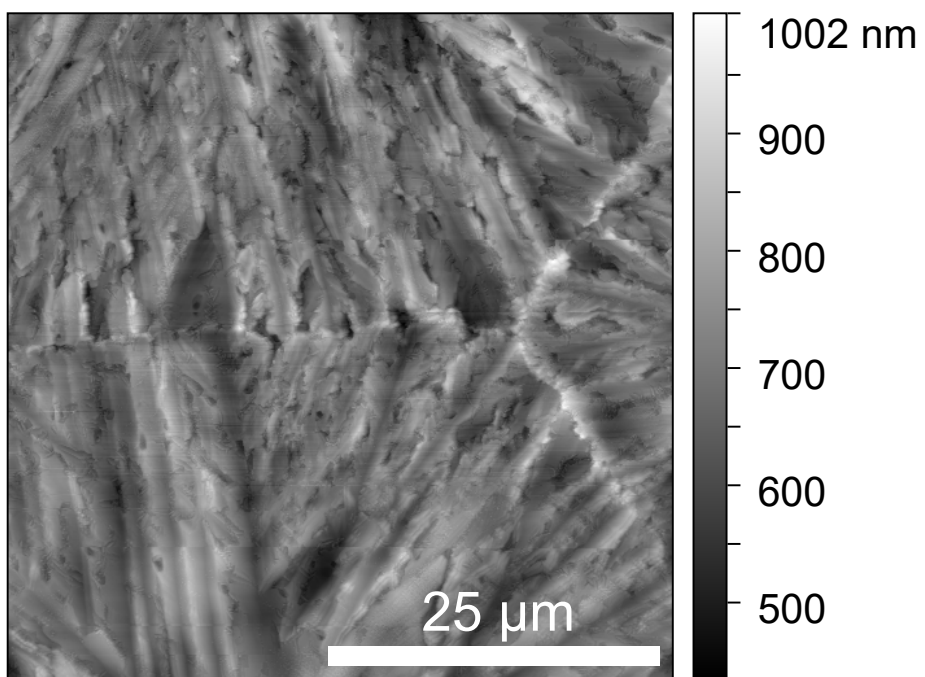


Fig. S9: AFM image of a patterned MAPbI₃ film (50 μm pitch).

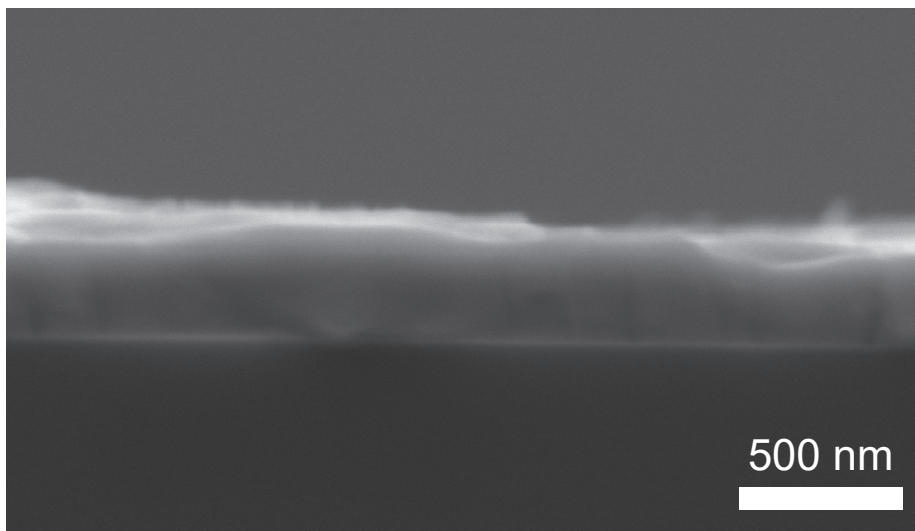


Fig. S10: Cross-section SEM image of a patterned MAPbI₃ film (100 μ m pitch). This film has a thickness of $380 \text{ nm} \pm 25 \text{ nm}$, but note that the film thickness varies significantly with all experimental parameters, such as the array pitch, perovskite composition and annealing method.