

Supplementary information

Thermal and illumination effect on PbI_2 nanoplate and its transformation to $\text{CH}_3\text{NH}_3\text{PbI}_3$ perovskite†

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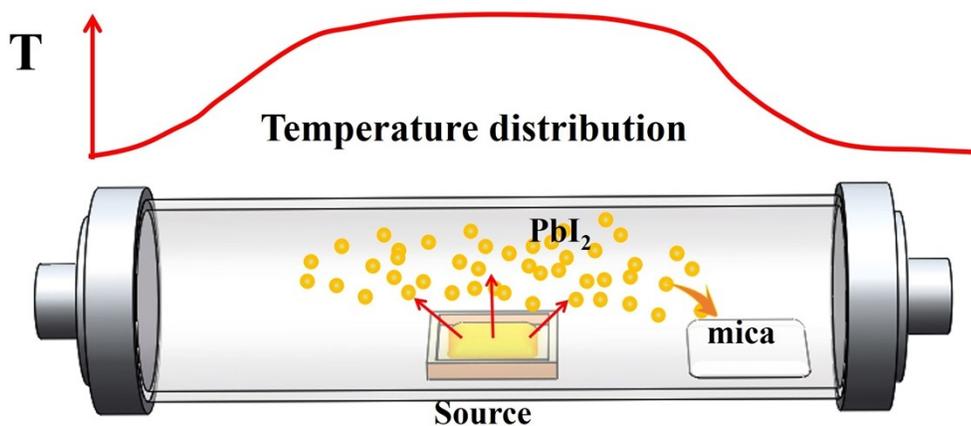


Fig. S1. Schematic experimental setup of the PbI_2 growth process

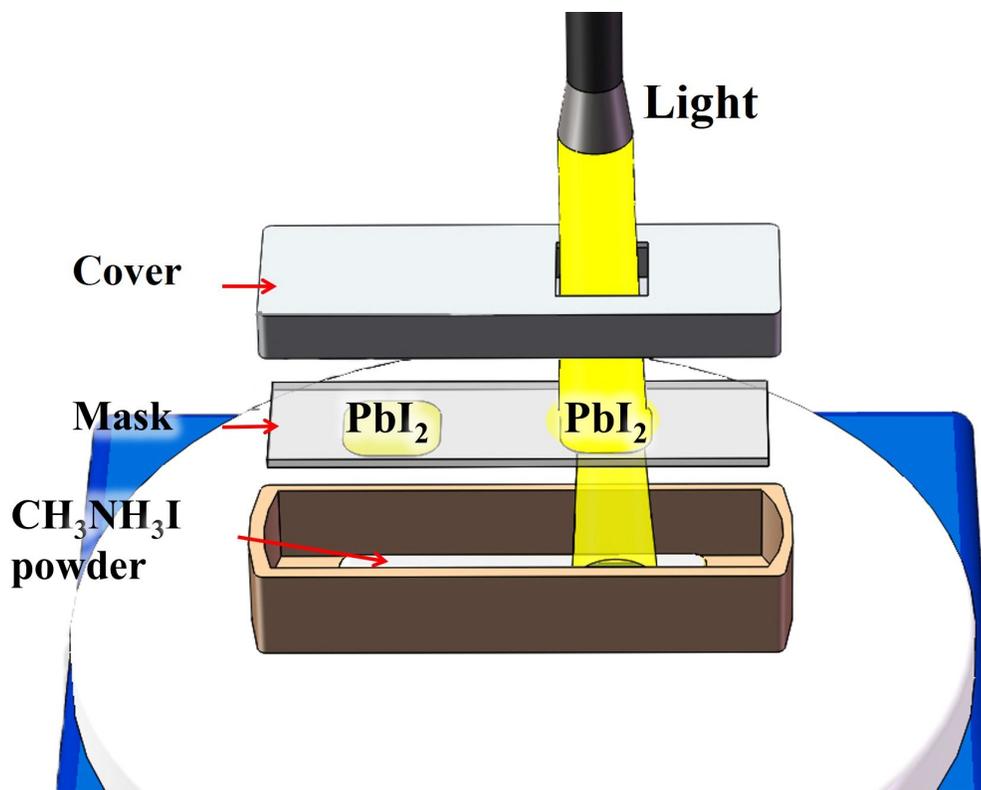


Fig.S2. Schematic of the growth of MAPbI₃ in dark and illumination condition

The CH₃NH₃I powders were placed uniformly at the bottom of a alumina crucible. Two PbI₂ samples were placed on the mask with the PbI₂ facing the CH₃NH₃I powder with a 10 mm space in between. A top cover was placed on the crucible to ensure a sealed space for reaction. A window was opened at one side to allow illumination or observation during reaction. The crucible was placed on center of the heater plate preheated to 150 °C.

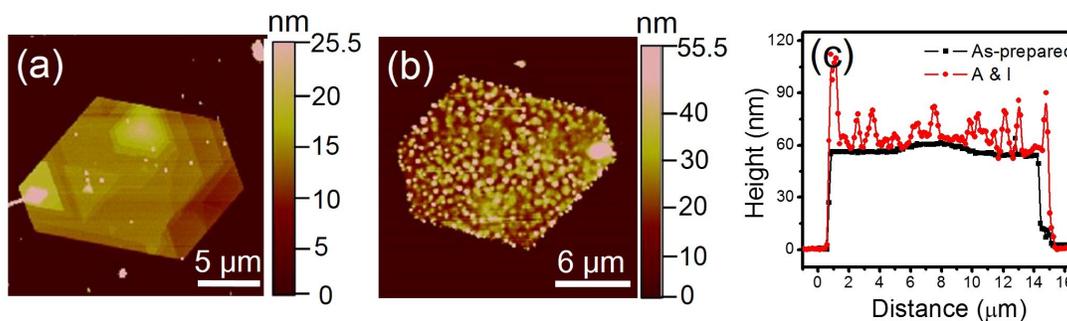


Fig.S3 The AFM topography of as-prepared PbI₂ sample (a) exposure with illumination and annealing at the same time (b). The comparison of the topography before and after illumination and annealing in (c)

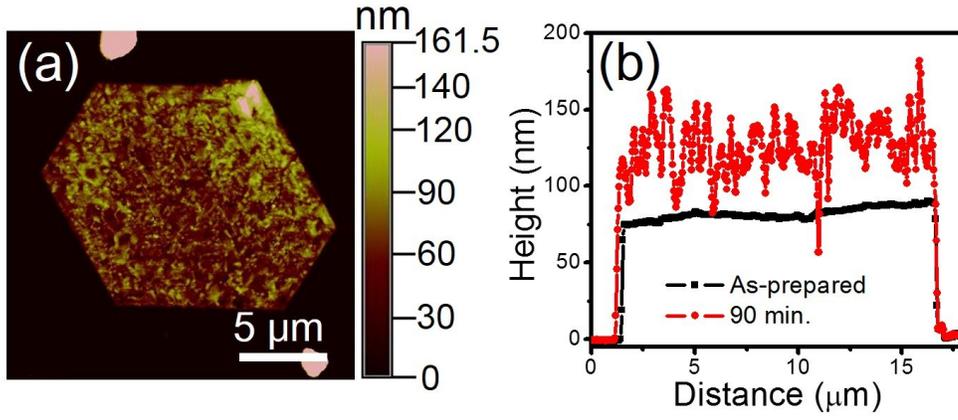


Fig.S4 The AFM topography (a) of PbI₂ after fully reaction with MAI in dark and the line profiles changes (b) before and after reaction.

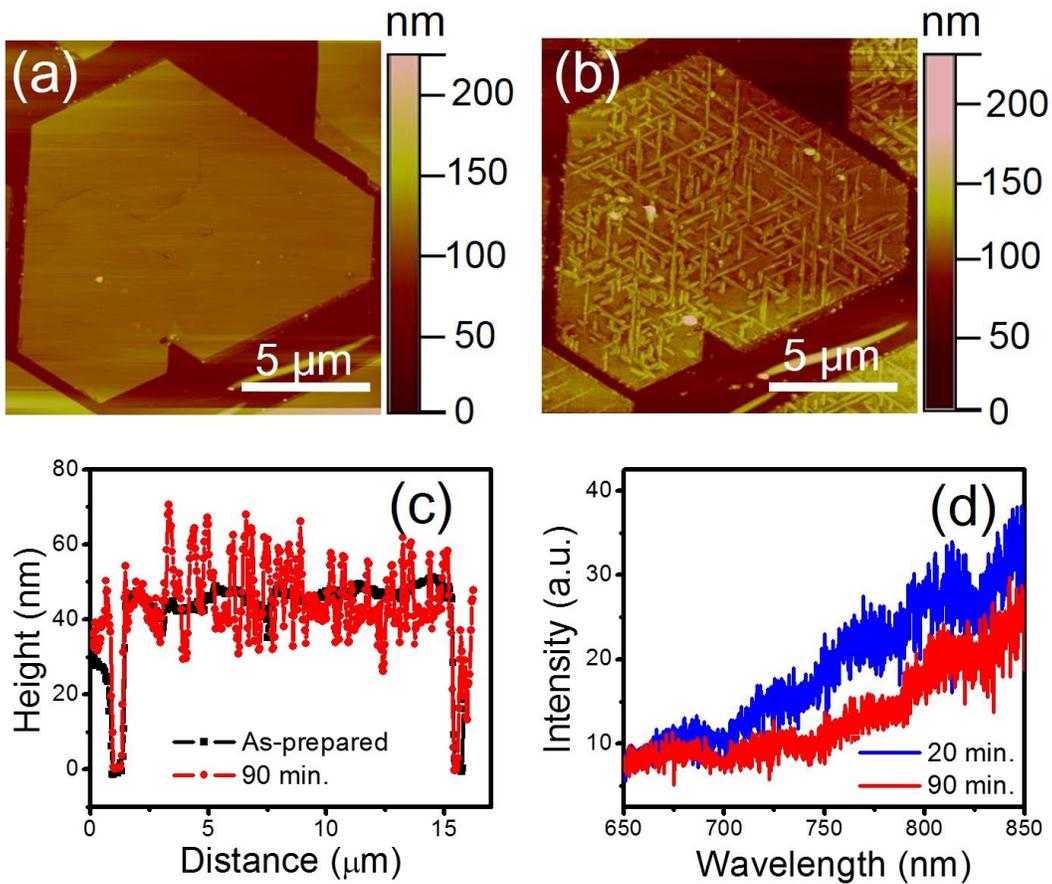


Fig.S5 The AFM topography of as-prepared PbI₂ sample exposure in MAI vapor with 20 min (a) and 90 min (b). The comparison of the topography before and after exposure in

illumination in (c); (d) the PL spectra of perovskite with different time for illumination exposure from the top surface.

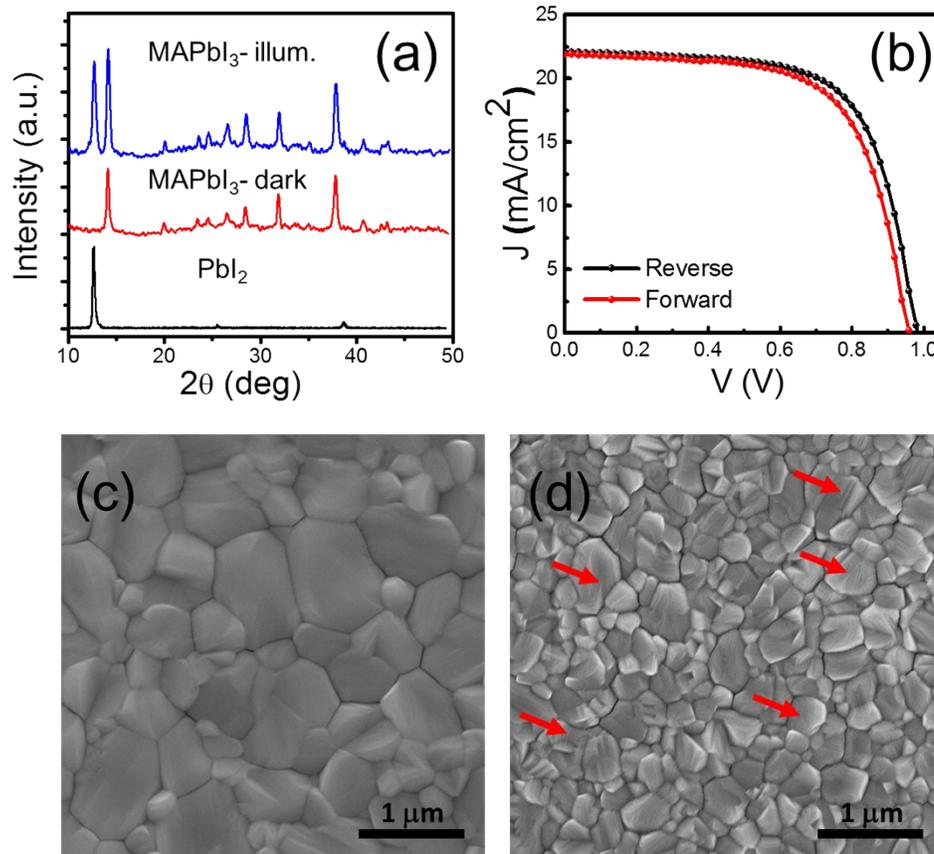


Fig. S6 (a) XRD of PbI₂ thin film and the as-prepared MAPbI₃ in dark and under illumination. (b) J-V curves of device with FTO/TiO₂/C₆₀/MAPbI₃/Spiro/Au structure. It shows very small hysteresis, showing that hysteresis comes from the interface charging at TiO₂/MAPbI₃. SEM images of MAPbI₃ in dark (b) and under illumination (c). Under illumination, clear PbI₂ peak appears. At the same time, the as-prepared MAPbI₃ shows smaller grain sizes and grains with layer structure (such as the areas pointed by red arrow in (d)). It imply that illumination has suppress the fully conversion of PbI₂ to MAPbI₃.