Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Infotmation

Pure 2H Phase $MoSe_2$ Nanosheets Promote Formation of Porous PbI_2 Film and Modulate Residual Stress for Highly Efficient and Stable Perovskite Solar Cells

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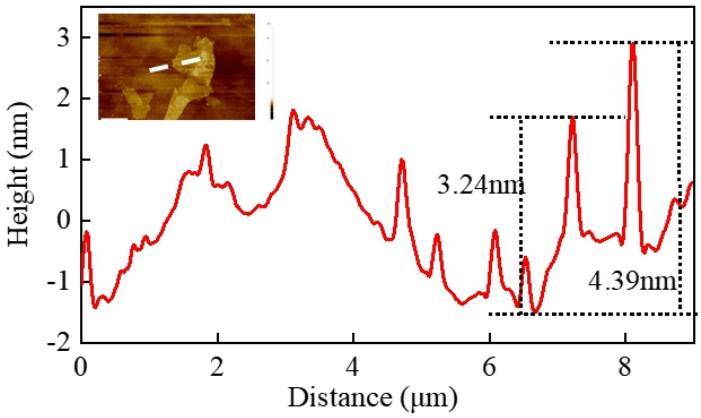

Figure S1. Height profiles of 2D $MoSe_2$ nanosheets and the AFM images (shown in the inset)

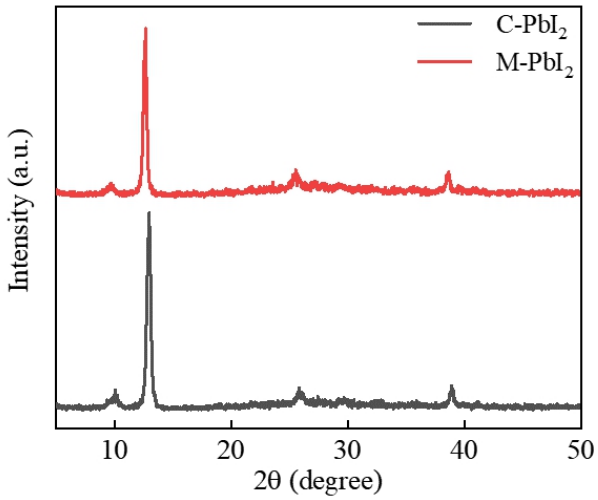

Figure S2. XRD patterns of the C-PbI_2 film and M-PbI_2 film.

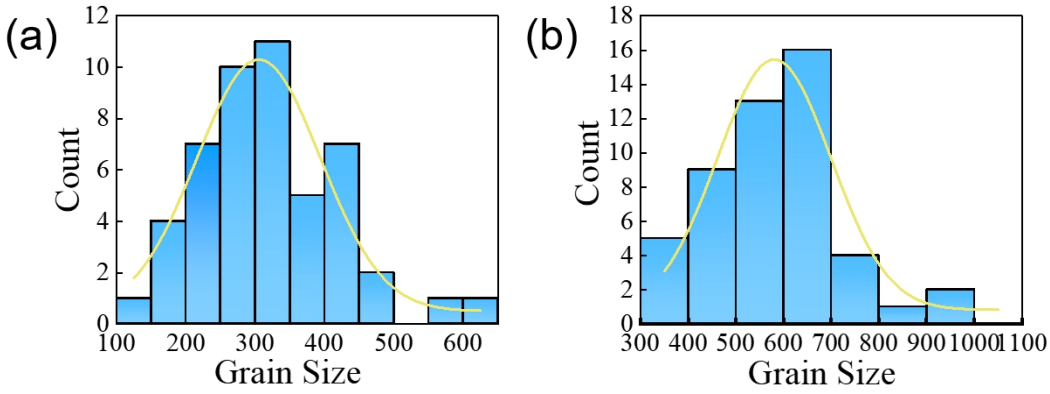

Figure S3. The corresponding grain size statistic distribution graph extracted from SEM top-view image.

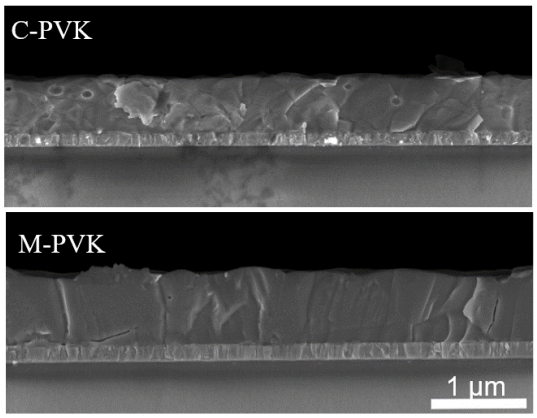

Figure S4. Cross-sectional SEM images of C-PVK film and M-PVK film.

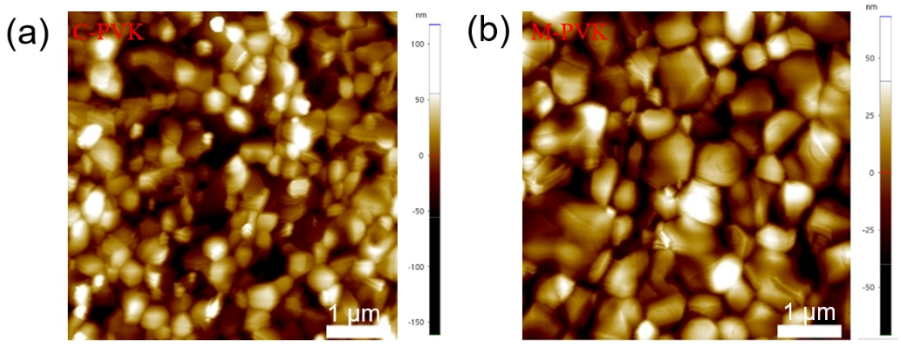

Figure S5. AFM image of (a) C-PVK film and (b) M-PVK film.

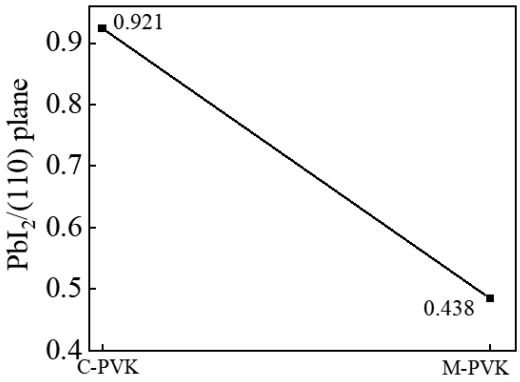

Figure S6. Corresponding peak of XRD ratio of PbI_2/(110).

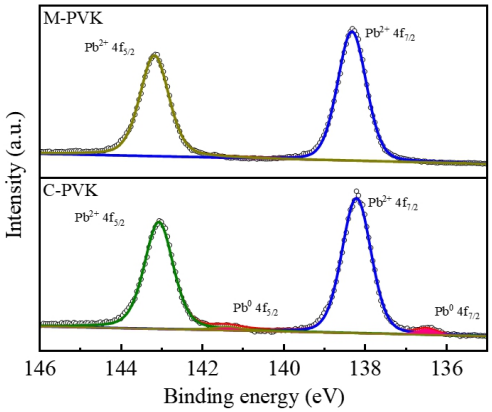

Figure S7. High-resolution XPS spectra of Pb 4f spectra.

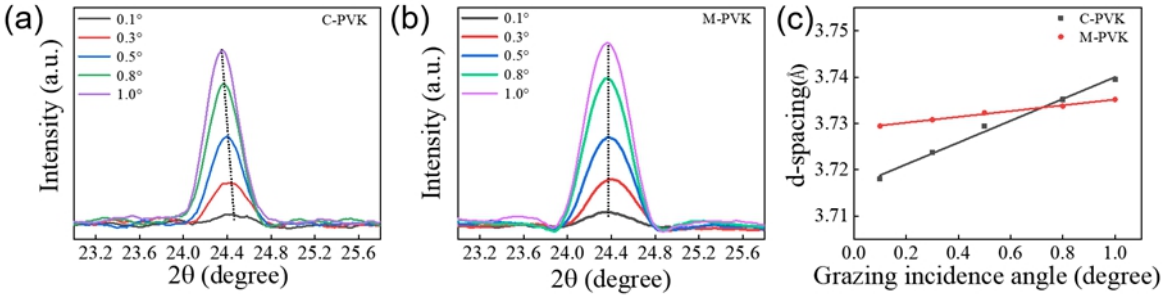

Figure S8. Depth-dependent GIXRD patterns of (a) C-PVK film and (b) M-PVK film film. (c) D-spacing values obtained from perovskite (202) plane as a function of incidence angle.

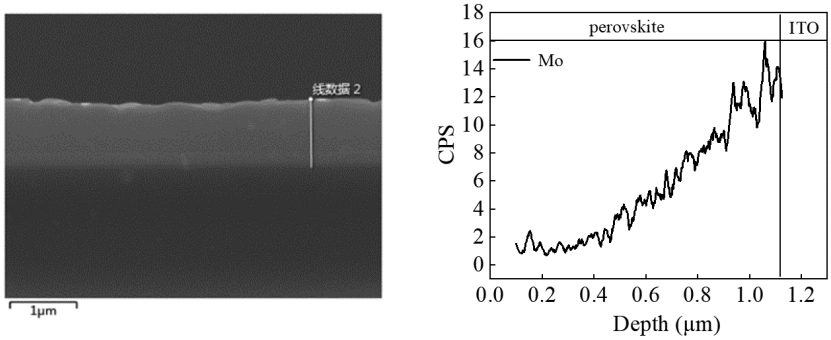

Figure S9. Cross-section of SEM-EDS elemental mapping (Mo) for the M-PVK film.

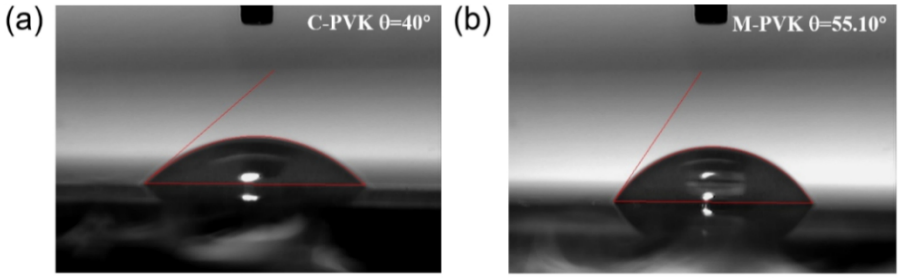

Figure S10. Contact angle of (a) C-PVK film and (b) M-PVK film.

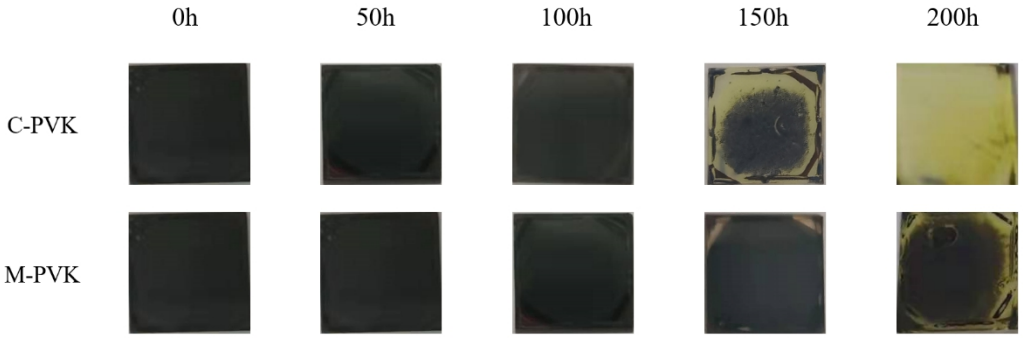

Figure S11. Comparison of the stability of perovskite film stored in ambient air with a 30−40% relative humidity at room temperature.

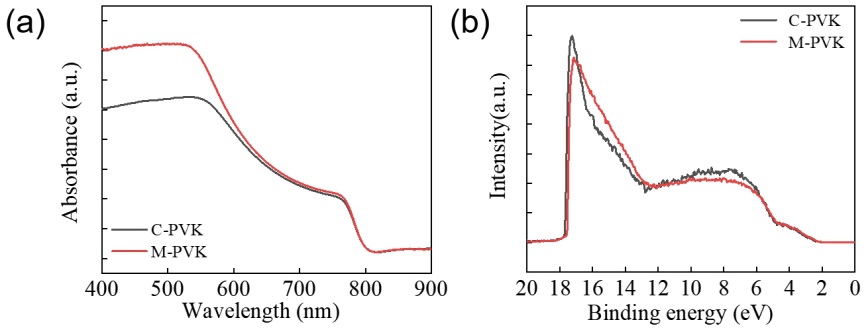

Figure S12. (a) UV-Vis absorption spectra of C-PVK and M-PVK films. (b) Corresponding UPS map of C-PVK film and M-PVK film.

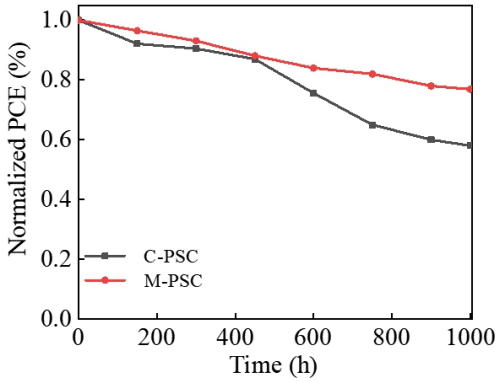

Figure S13. Comparison of the stability of representative unencapsulated solar cells stored in 15-20% humidity at room temperature.

Table S1. Parameters fitted from Nyquist plots measured under dark conditions for C-PSCs and M-PSCs.

	Rs	Rp	CPE-T	CPE-P
C-PSC	107.6	291870	3.00E-09	0.972
M-PSC	60.11	569040	2.57E-09	0.987