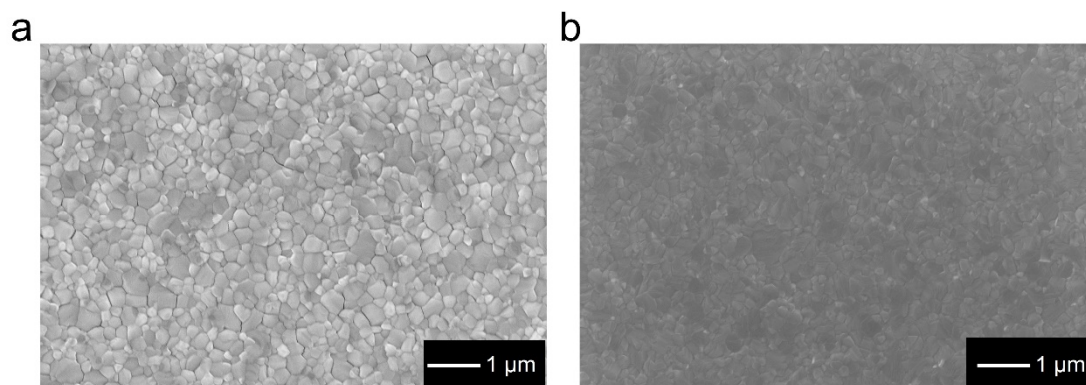
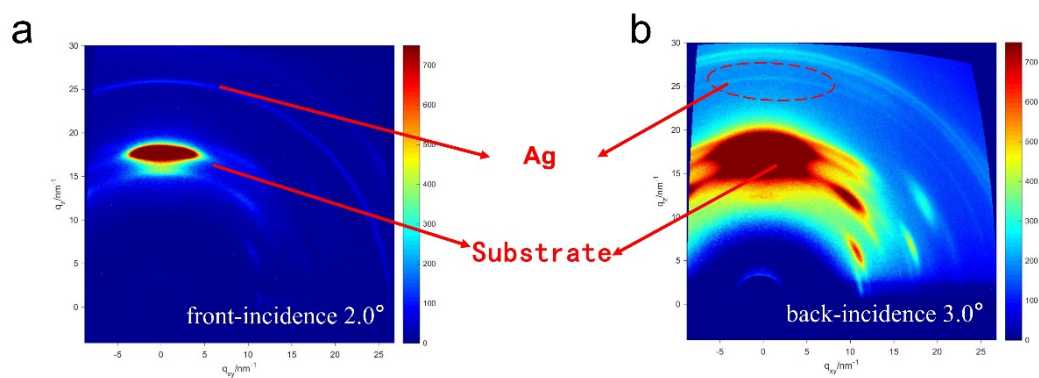


## Supplementary Materials

### Probing Buried Interfaces and Phase Gradients in MAPbI<sub>3</sub> Films via Combined Back- and Surface-Incidence GIXRD



**Figure S1.** The SEM images of MAPbI<sub>3</sub> thin films prepared on (a) a ITO glass substrate and (b) a PET flexible substrate, respectively.



**Figure S2.** The 2D GIXRD patterns of a Ag film at incident angles of (a) 2.0° on the film surface and (b) 3.0° on the back of its substrate, respectively.

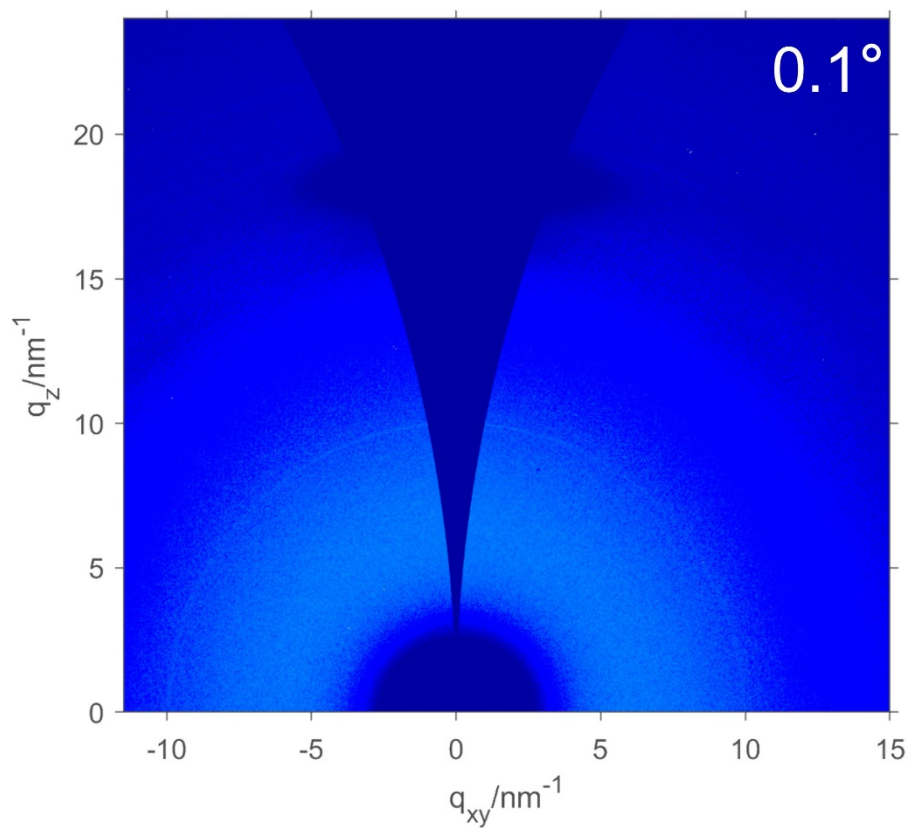


Figure S3. The 2D GIXRD patterns at an incident angle of  $0.1^\circ$  on the film surface

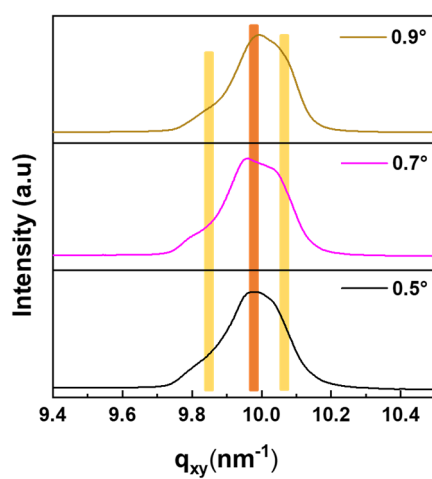
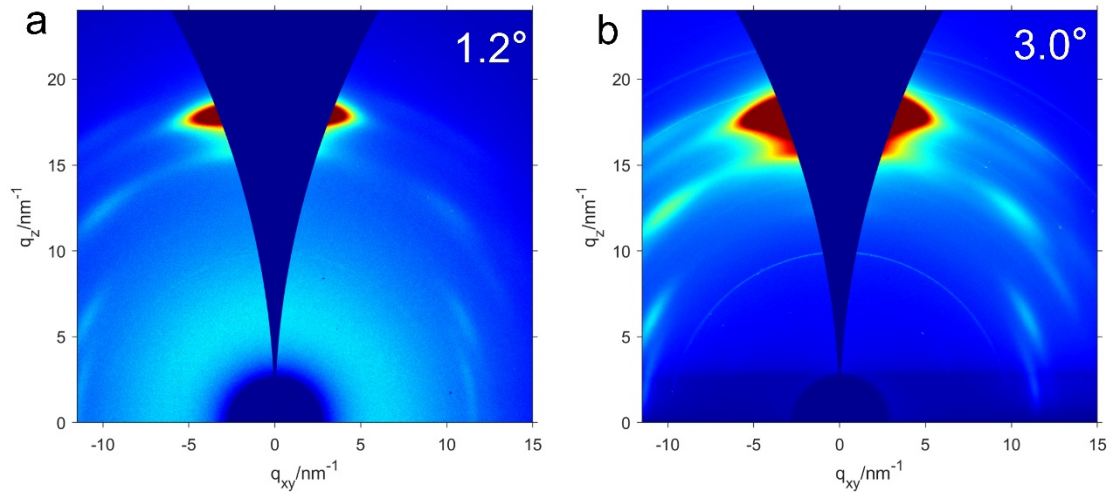


Figure S4. Radial integration plots of 2D GIXRD patterns at  $q \approx 10.0 \text{ nm}^{-1}$  for the film surface prepared on ITO glass under different incident angles.



**Figure S5. The 2D GIXRD patterns at incident angles of (a)  $1.2^\circ$  and (b)  $3.0^\circ$  on the back of the substrate, respectively.**