

Supporting information

Interface Engineering in Planar Perovskite Solar Cells: Energy Level Alignment, Perovskite Morphology Control and High Performance Achievement

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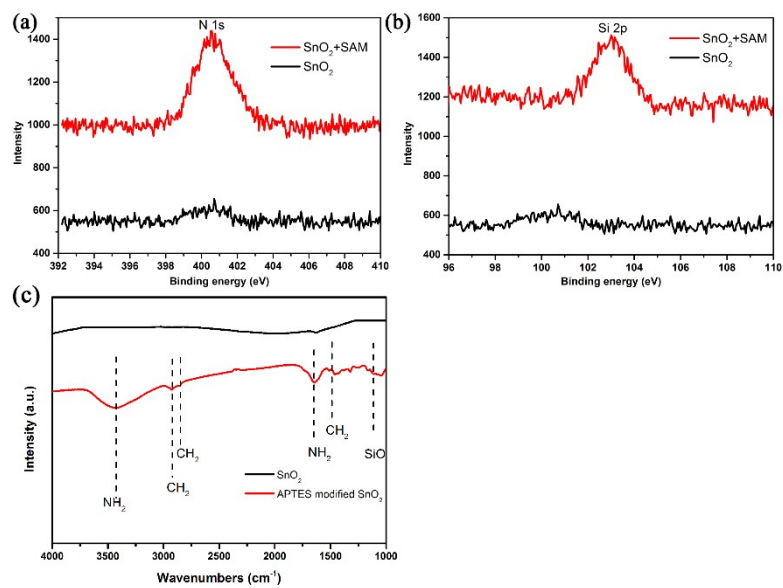


Figure S1. XPS spectra and FTIR spectra of SnO₂ films with and without APTES SAM modification.

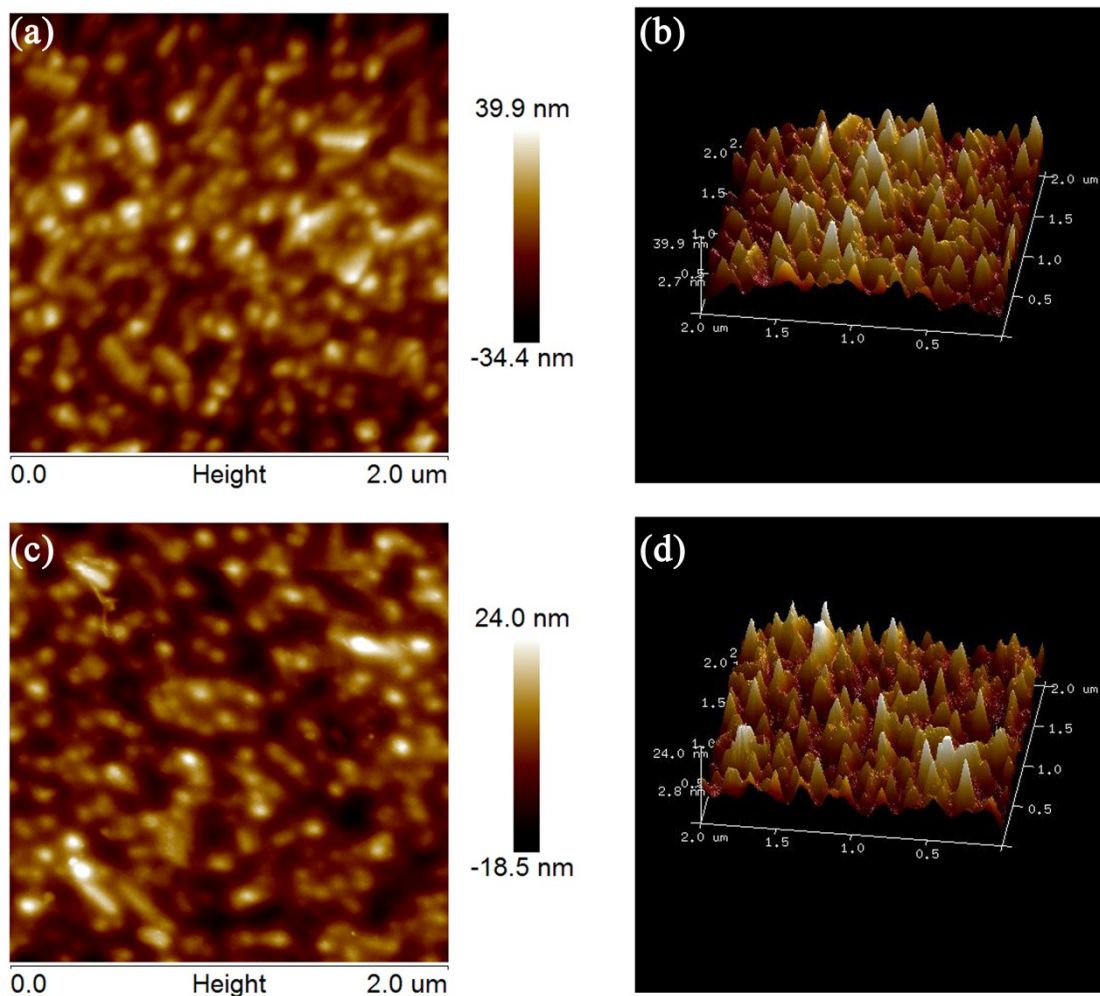


Figure S2. AFM images of SnO₂ electron selective layer deposited on the FTO glass with (c, d) and without (a, b) SAM modification.

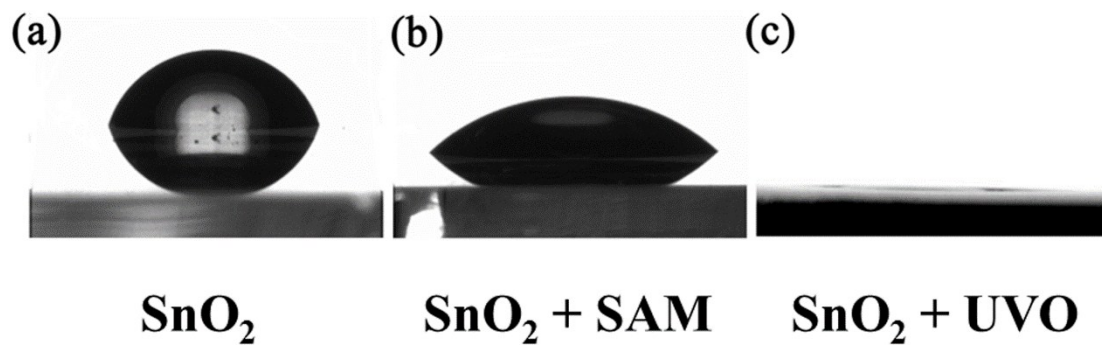


Figure S3. The contact angle of water on the SnO₂ substrates (a), with APTES SAM (b) and UVO (c) treatment are 71.14°, 35.26° and 4.17°, respectively.

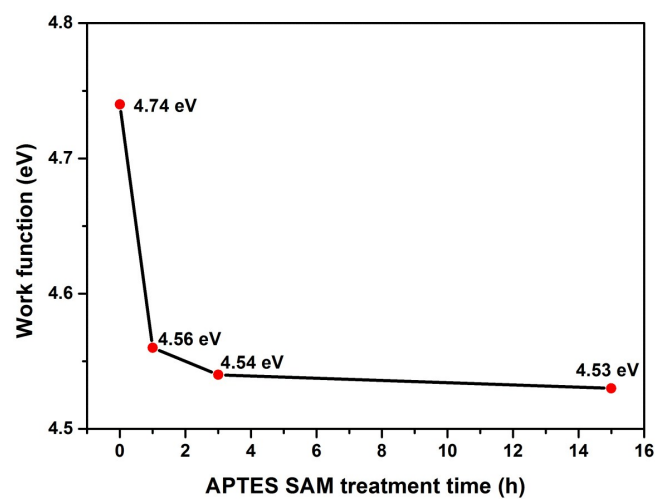


Figure S4. Work function for APTES SAM-treated SnO₂ surfaces as a function of APTES SAM treatment time.

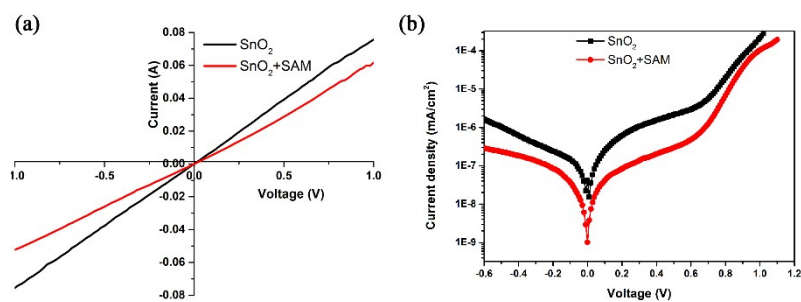


Figure S5. (a) J-V curves for SnO₂ films with and without APTES SAM modification in the structure of FTO/SnO₂/Au. The thickness of SnO₂ film is about 50 nm. (b) Dark J-V curves for planar perovskite solar cells using SnO₂ (with and without APTES SAM modification) ESLs.

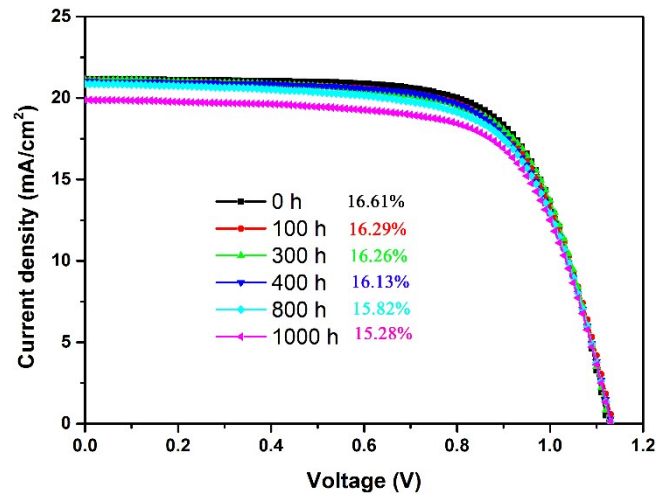


Figure S6. Long-term stability tests (~30% humidity) for 1000 h of an APTES SAM – treated device.

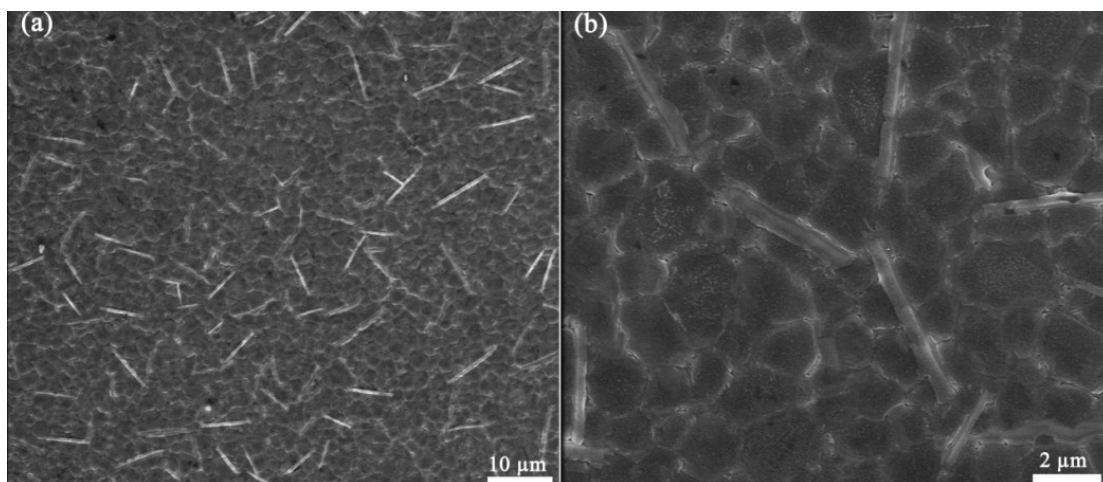


Figure S7. Top view SEM images of $\text{CH}_3\text{NH}_3\text{PbI}_3$ films with 5% $\text{Pb}(\text{SCN})_2$ in the precursors deposited on SAM-modified SnO_2 ESL at different magnifications.

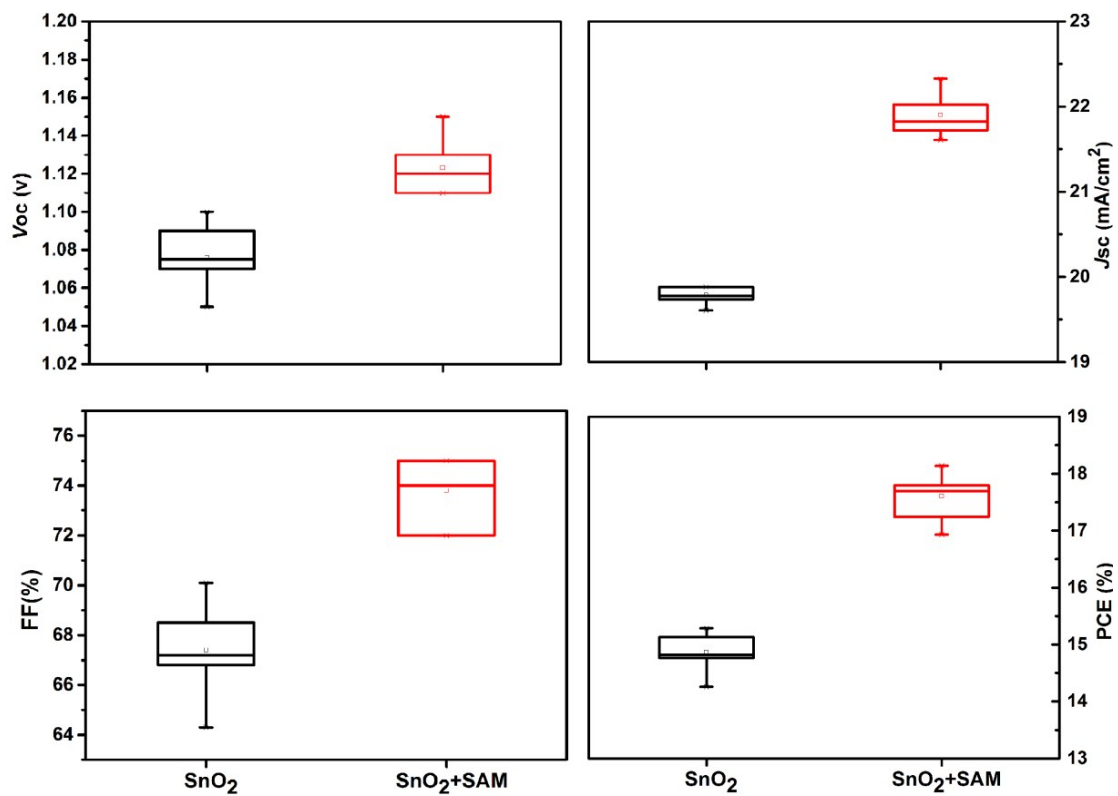


Figure S8. Photovoltaic parameters statistics of planar PSC with and without APTES SAM modification as collected from the same batch.