Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Multifunctional Chemical Linker in Buried Interface for Stable and Efficient Planar Perovskite Solar Cells

Quanming Geng[a,b], Zong Xu[a], Wenwu Song[a], Yanqiang Hu[a,b,*], Guangping Sun[a], Jin Wang[a], Minmin Wang[a], Tongming Sun[a], Yanfeng Tang[a,*], Shufang Zhang[b,*]

[a]College of Chemistry and Chemical Engineer, Nantong University, Nantong 226001, Jiangsu, China.
[b]School of Physics and Photoelectronic Engineering, Ludong University, Yantai 264025, Shandong, China.

This file includes **Figure S1-S13** and **Table S1**:

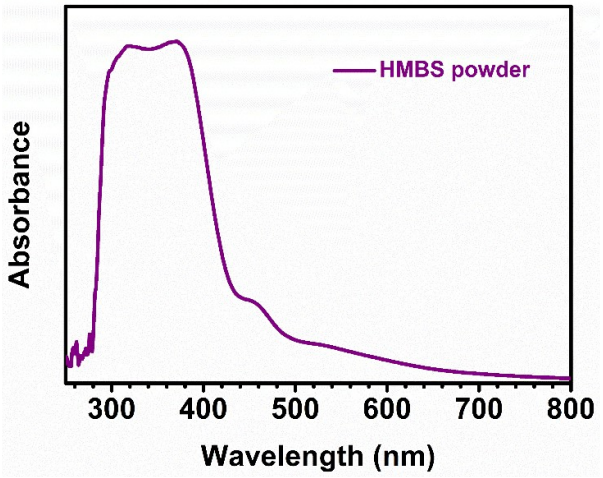

Figure S1. Absorption spectrum of HMBS powder.

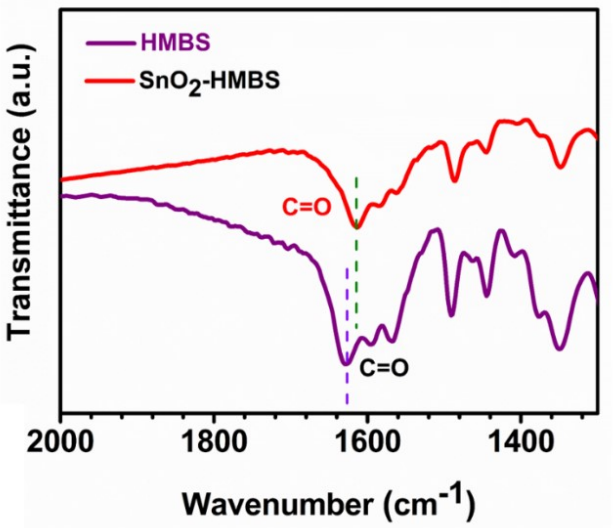

Figure S2. FTIR spectra of pure HMBS powder and HMBS-modified SnO_2 film.

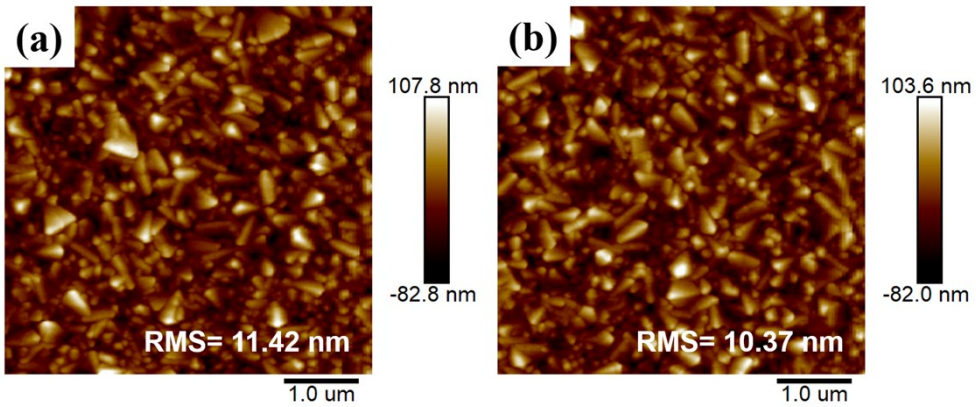

Figure S3. AFM images of SnO_2 films (a) without and with (b) HMBS modification.

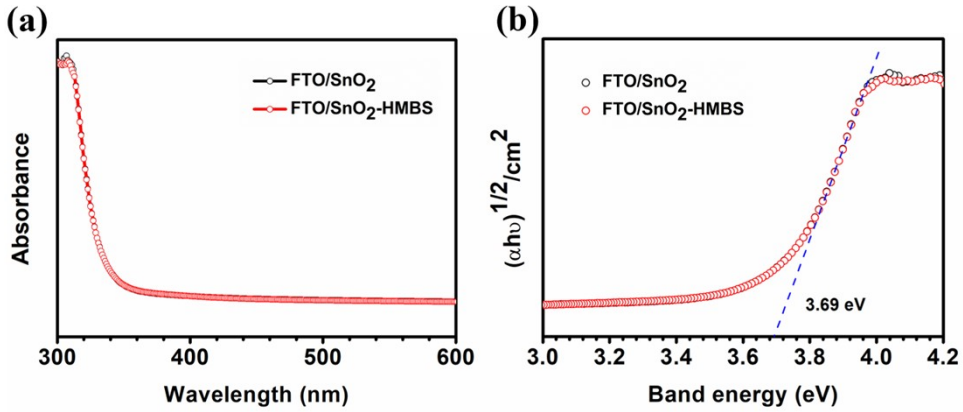

Figure S4. (a) Optical absorbance and (d) corresponding Tauc plots of SnO_2 films without or with HMBS modification.

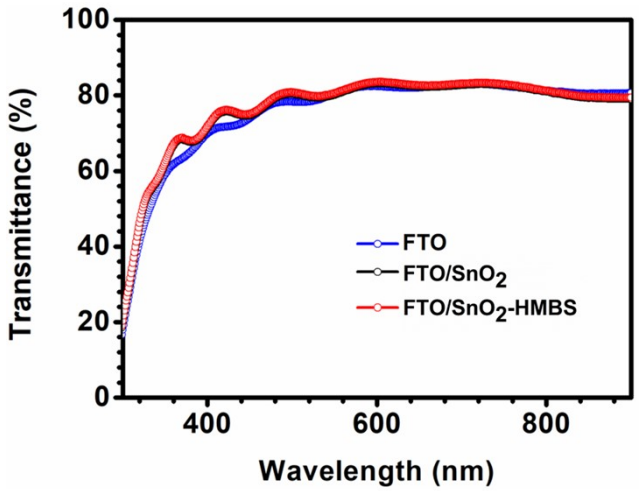

Figure S5. Transmission spectrum of SnO_2 films without or with HMBS modification.

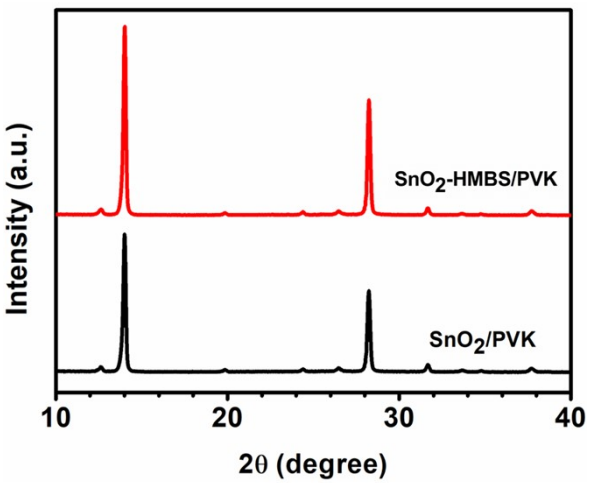

Figure S6. XRD spectra of perovskite films prepared without or with HMBS-modified SnO_2 substrates.

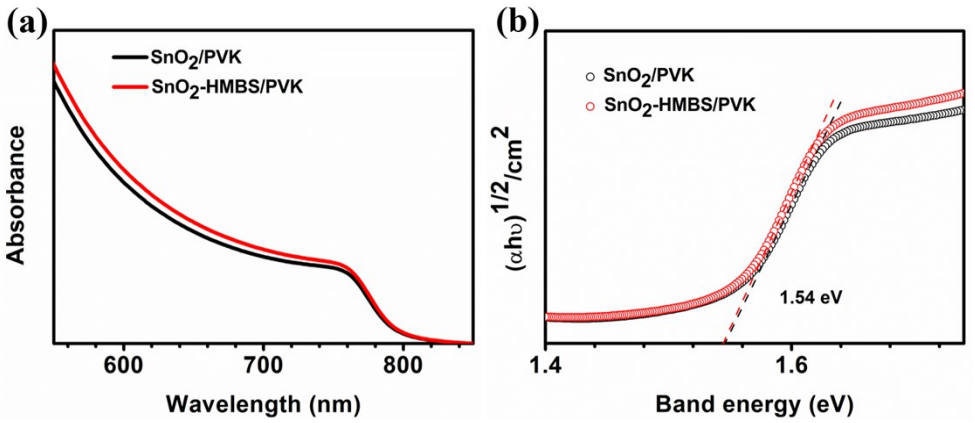

Figure S7. (a) Optical absorbance and (d) corresponding Tauc plots of perovskite films prepared without or with HMBS-modified SnO_2 substrates.

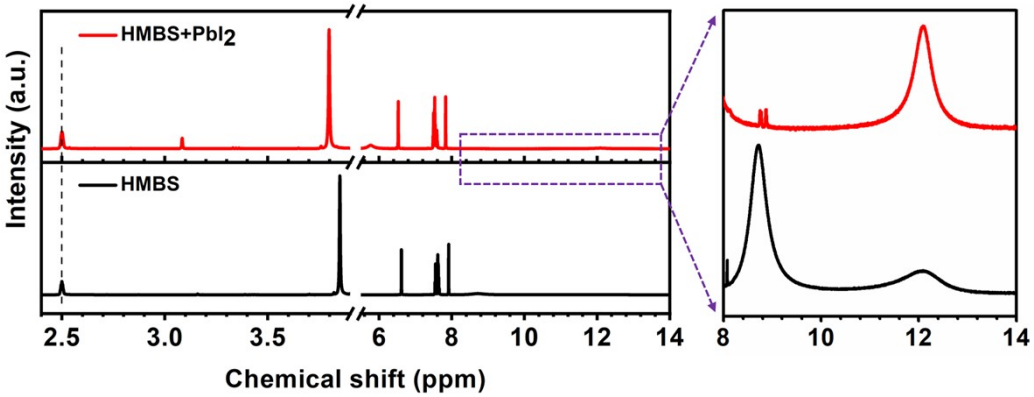

Figure S8. Liquid-state ^1H NMR spectra of pure HMBS and PbI_2/HMBS dissolving in DMSO-d_6, respectively.

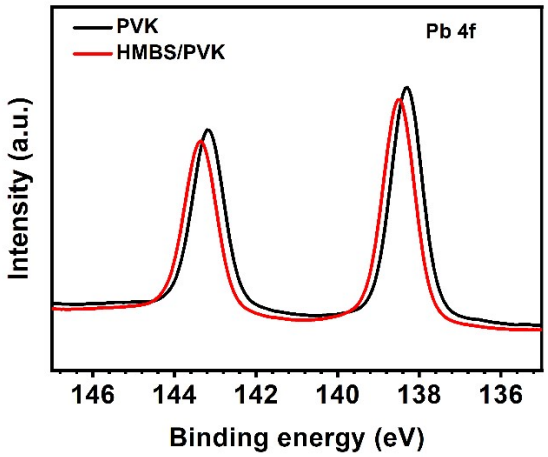

Figure S9. Pb 4f XPS spectra of perovskite films stripped on bare SnO_2 and HMBS-modified SnO_2 substrate.

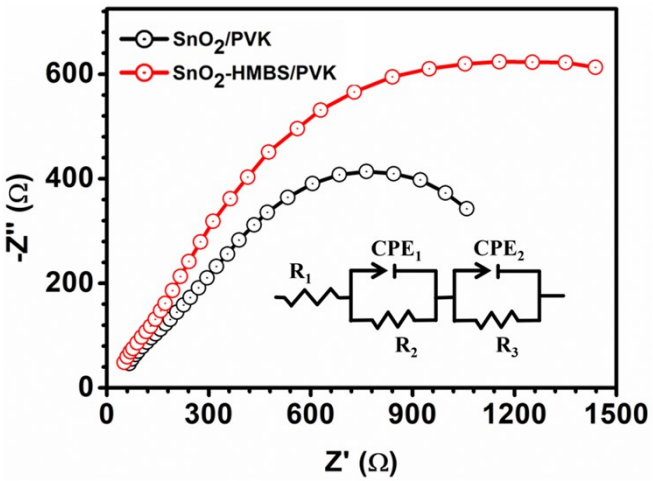

Figure S10. Nyquist plots of the controlled device and HMBS-modified device. The inset is the equivalent circuit.

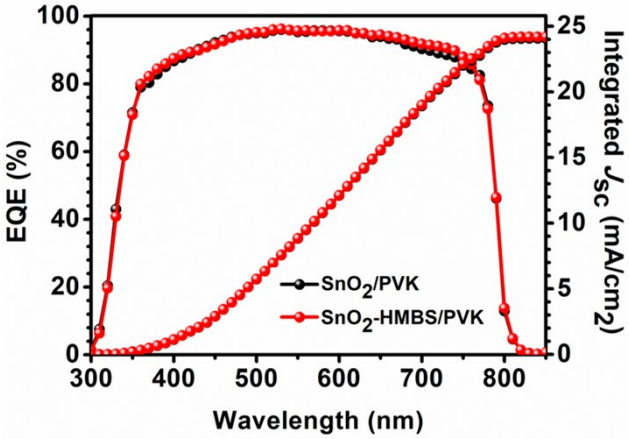

Figure S11. EQE spectra of the controlled and HMBS-modified PSCs.

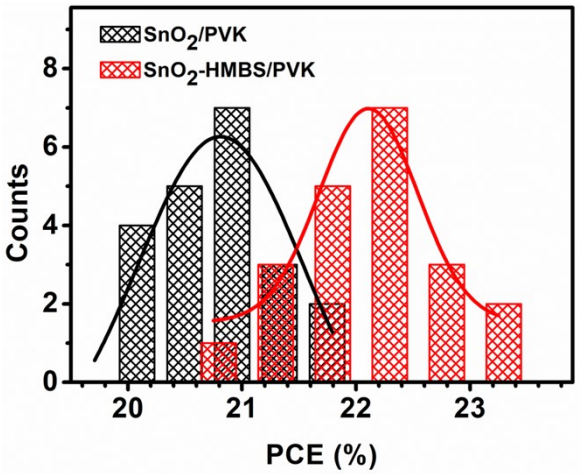

Figure S12. Statistical distribution of PCE of the controlled and HMBS-modified PSCs. The statistical data were collected from 16 cells for each case.

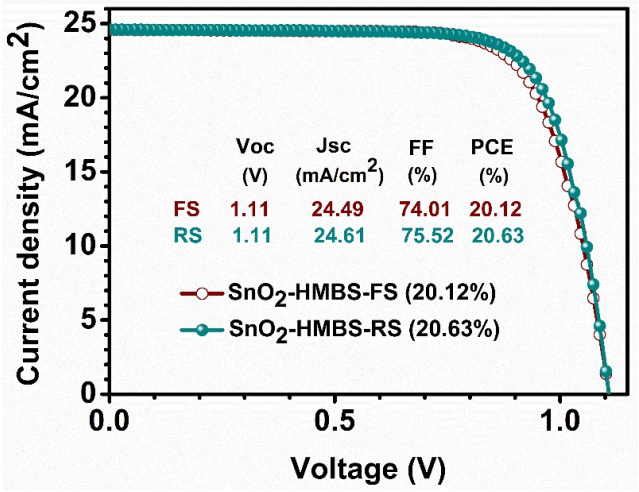

Figure S13. Champion *I-V* curve of 1 cm^2 sized HMBS-modified PSCs.

Table S1. The photovoltaic performance parameters of the optimal small size (0.09 cm^2) devices based on different perovskite films.

Sample	Voc (V)	Jsc (mA cm^{-2})	FF (%)	PCE
0.00 mg/mL	1.12	24.52	79.23	21.75
0.05 mg/mL	1.15	24.53	80.17	22.62
0.10 mg/mL	1.16	24.56	81.98	23.42
0.15 mg/mL	1.14	24.47	80.29	22.40