Supporting Information

Yb-Doped SnO_2 Electron Transfer Layer Assisting the Fabrication of High-Efficiency and Stable Perovskite Solar Cells in Air

Dixin Liu,[a,‡] WenYuan Zhang,[a,‡] Xin Li [a,*], Ziqiu Ren[b,*]

[a]*MIIT Key Laboratory of Critical Materials Technology for New Energy Conversion and Storage, School of Chemistry and Chemical Engineering, State Key Lab of Urban Water Resource and Environment, Harbin Institute of Technology, 150001 Harbin, China*

[b] *Henan Institute of Advanced Technology, Zhengzhou University, Zhengzhou 450052, P.R. China*

‡*These authors contributed equally to this work.*

*Corresponding author: Xin Li, Ziqiu Ren

E-mail address: lixin@hit.edu.cn (X. Li), renziqiu@hit.edu.cn (Z. Ren)

Table S1 Work function of SnO_2 and Yb-doped SnO_2 film

	SnO_2	Yb-doped SnO_2	HOPG[a]
Surface potential (mV)	-370.21	-477.69	1.040
ΔSP[b] (mV)	-369.17	-476.56	/
Work Function[c] (eV)	4.28	4.17	4.65

[a] HOPG (highly oriented pyrolytic graphite) was used as a reference work function of 4.65eV given by supplier;

[b] ΔSP = SP(samples)-SP(HOPG);

[c] Work Function = e△SP + 4.65eV.

Table S2 Device performance of SnO_2 and Yb-doped SnO_2 perovskite solar cells. The parameters are obtained from the average of 30 devices.

Type	*Jsc* (mA cm^{-2})	*Voc* (V)	FF (%)	PCE (%)
SnO_2 device	19.12±1.49	0.98±0.04	67.14±4.48	12.63±0.91
Yb-doped SnO_2 device	20.24±0.70	1.01±0.02	72.60±2.51	14.92±0.50

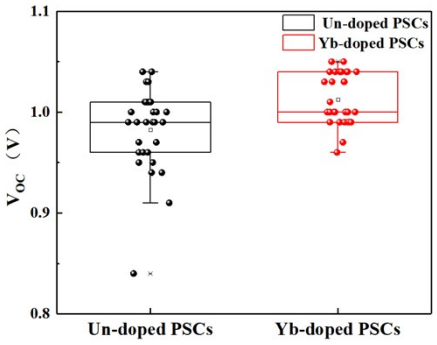

Fig. S1. *Voc* histograms of PSCs

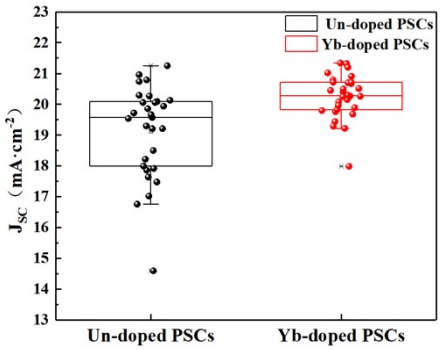

Fig. S2. *Jsc* histograms of PSCs

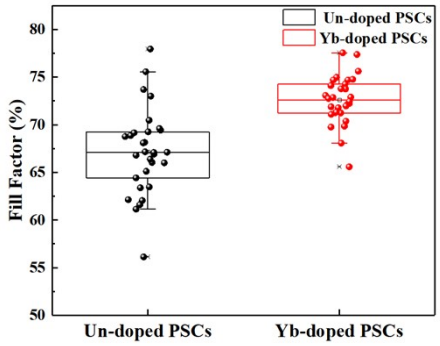

Fig. S3. Fill factor histograms of PSCs

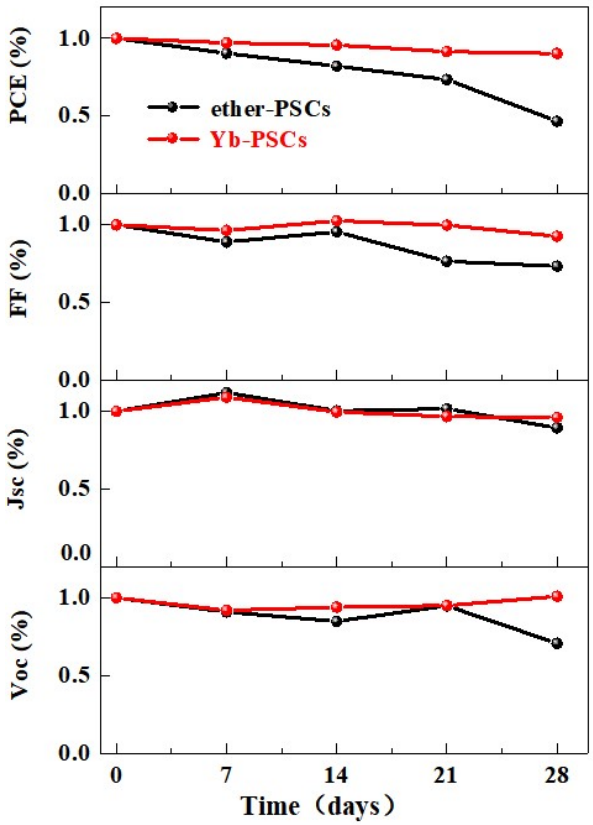

Fig. S4. Long term stability tests of control and optimized devices.