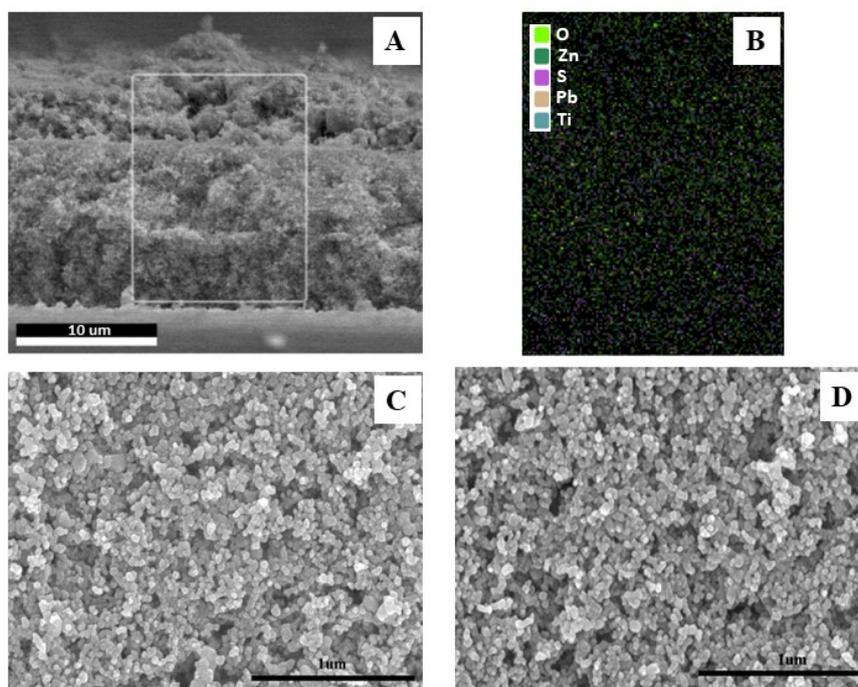


## Support Information

### Enhanced film quality of PbS QD solid by Eliminating the oxide traps through an in-situ surface etching and passivation

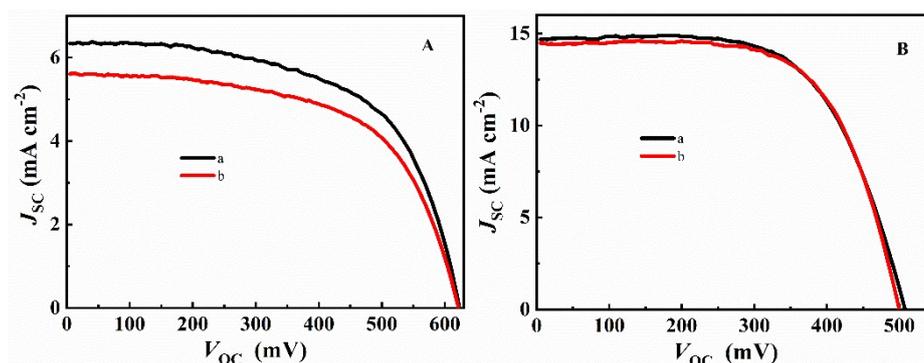
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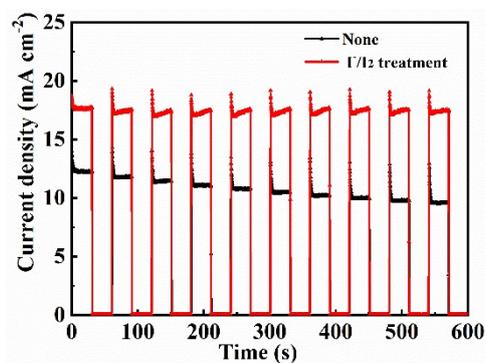
**Figure S1** (A) Cross-sectional image of the pristine PbS/ZnS film, (B) elemental mapping of PbS/ZnS film in the rectangular area in (A), (C,D) top view SEM images of PbS/ZnS film before (C) and after (D) I<sup>-</sup>/I<sub>2</sub> treatment.

**Table S.** Photovoltaic parameters and their average with standard deviation of five PbS QDSSCs with (T) and without (N) I<sup>-</sup>/I<sub>2</sub> treatment.

cell	Treatment	$J_{SC}$ (mA.cm <sup>-2</sup> )	$V_{OC}$ (mV)	FF	$\eta$ (%)
1	N	19.73	378	0.535	3.96
	T	21.17	418	0.536	4.71
2	N	19.26	382	0.542	3.92
	T	21.04	428	0.533	4.77
3	N	19.89	392	0.524	4.01
	T	22.2	422	0.511	4.7
4	N	19.77	393	0.528	4.02
	T	22.29	423	0.519	4.8
5	N	18.84	386	0.551	4
	T	21.35	421	0.544	4.82
Average	N	19.50±0.66	386±8	0.536±0.02	3.98±0.06
	T	21.61±0.68	422±6	0.529±0.02	4.76±0.06



**Figure S2.**  $J$ - $V$  curves of CdS (A) and CdS/CdSe (B) sensitized QDSSCs without (a) and with (b) I<sup>-</sup>/I<sub>2</sub> treatment.



**Figure S3.** Short circuit photocurrent density of QDSSC of TiO<sub>2</sub>/PbS with and without I<sub>2</sub>/I<sub>3</sub> treatment as a function of time using periodic illumination intervals.