

**Electronic Supporting Information (ESI)**

**ZnS and metal hydroxide composite passivation layer for recombination control  
in high efficiency quantum dot sensitized solar cells**

Zhenxiao Pan and Xinhua Zhong\*

College of Materials and Energy, South China Agricultural University, 483 Wushan Road,  
Guangzhou 510642, China

Email: zhongxh@ecust.edu.cn (X.Z.)

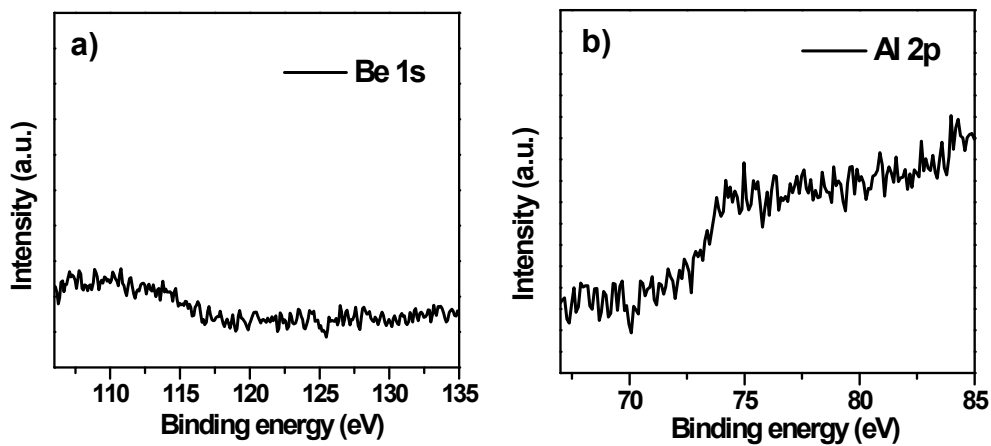
**Table S1** Average photovoltaic parameters of CdSeTe based QDSCs with addition of different concentration of Ga(NO<sub>3</sub>)<sub>3</sub> in Zn(OAc)<sub>2</sub> solution during ZnS treatment under the illumination of 1 full sun intensity (AM 1.5G, 100 mW/cm<sup>2</sup>).

<b>Concentration</b>	<b><math>J_{sc}</math> (mA.cm<sup>-2</sup>)</b>	<b><math>V_{oc}</math> (V)</b>	<b>FF</b>	<b>PCE (%)</b>
0 mM	20.96	0.668	0.634	8.88 ± 0.11
5 mM	20.89	0.686	0.637	9.13 ± 0.15
10 mM	21.05	0.701	0.644	9.50 ± 0.11
15 mM	20.82	0.696	0.628	9.10 ± 0.17

**Table S2** Individual photovoltaic parameters of CdSeTe based QDSCs with addition of different metal salts during ZnS treatment under the illumination of 1 full sun intensity.

	$J_{sc}$ (mA·cm <sup>-2</sup> )	$V_{oc}$ (V)	FF	PCE (%)
Ref	20.96	0.665	0.635	8.85
	20.84	0.668	0.629	8.76
	21.07	0.671	0.640	9.05
	21.01	0.667	0.637	8.93
	20.92	0.669	0.631	8.83
Average	20.96 ± 0.09	0.668 ± 0.002	0.634 ± 0.004	8.88 ± 0.11
Be(NO <sub>3</sub> ) <sub>2</sub>	20.74	0.663	0.628	8.64
	20.96	0.672	0.639	9.00
	20.83	0.670	0.634	8.85
	20.79	0.668	0.630	8.75
	20.91	0.665	0.635	8.83
Average	20.85 ± 0.09	0.668 ± 0.004	0.633 ± 0.004	8.82 ± 0.14
Mg(NO <sub>3</sub> ) <sub>2</sub>	20.84	0.698	0.645	9.38
	20.93	0.705	0.637	9.40
	20.99	0.700	0.634	9.31
	21.10	0.701	0.642	9.49
	21.06	0.696	0.640	9.38
Average	20.98 ± 0.10	0.700 ± 0.003	0.640 ± 0.004	9.39 ± 0.06
Ca(NO <sub>3</sub> ) <sub>2</sub>	21.17	0.699	0.628	9.29
	21.04	0.696	0.638	9.34
	20.88	0.692	0.641	9.26
	20.93	0.694	0.632	9.18
	20.97	0.701	0.635	9.33
Average	21.00 ± 0.11	0.696 ± 0.004	0.635 ± 0.005	9.28 ± 0.07

Al(NO <sub>3</sub> ) <sub>3</sub>	21.17	0.668	0.630	8.91
	20.95	0.671	0.638	8.97
	21.13	0.673	0.634	9.02
	20.84	0.671	0.637	8.91
	20.97	0.667	0.635	8.88
Average	21.01 ± 0.14	0.670 ± 0.002	0.635 ± 0.003	8.94 ± 0.06
Ga(NO <sub>3</sub> ) <sub>3</sub>	21.09	0.698	0.637	9.38
	21.20	0.702	0.648	9.64
	20.94	0.704	0.640	9.43
	21.13	0.695	0.644	9.46
	20.90	0.705	0.650	9.58
Average	21.05 ± 0.13	0.701 ± 0.004	0.644 ± 0.005	9.50 ± 0.11



**Fig. S1** X-photoelectron spectra of the QDs sensitized electrodes with  $\text{Be}(\text{NO}_3)_2$  and  $\text{Al}(\text{NO}_3)_3$  modified ZnS treatments: (a) Be 1s and (b) Al 2p signals.