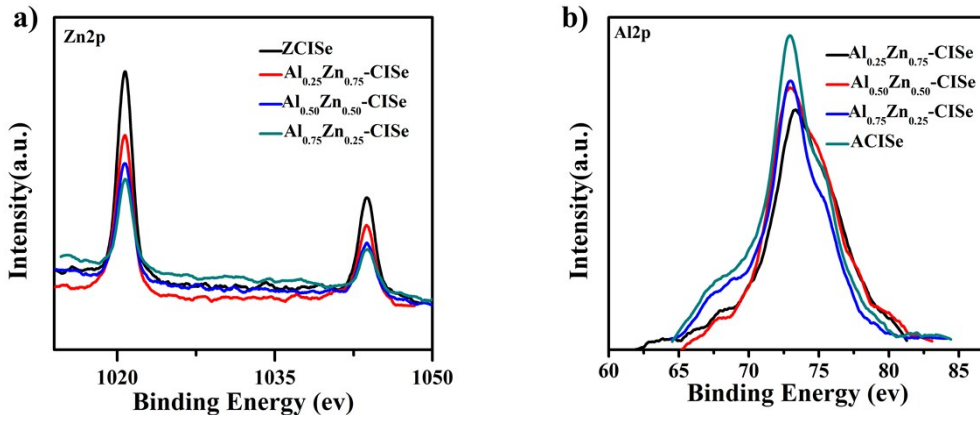**Supporting Information:**

Al/Zn co-incorporated Cu-In-Se Quantum Dots for High Efficiency Quantum Dot Sensitized Solar Cells

Fangfang He, [a] Wei Wang, [a] Weinan Xue, [a] Yiling Xie, [a] Qianwen Zhou, [b] Jiachen Zhang, [a] and Yan Li [a], *
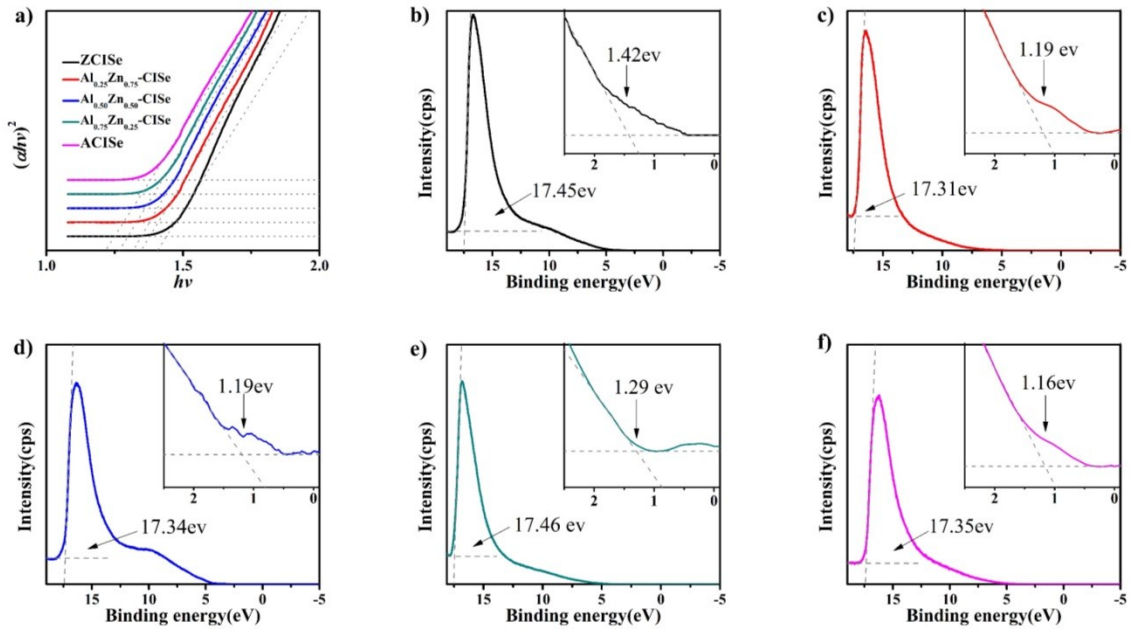
[a]*Key Laboratory for Advanced Materials, Shanghai Key Laboratory of Functional Materials Chemistry, School of Chemistry and Molecular Engineering, East China University of Science and Technology, Shanghai 200237, China.*

[b]*Department of Chemistry & State Key Laboratory of Molecular Engineering of Polymers, Fudan University, 2005 Songhu Road, Shanghai 200433, P.R. China.*
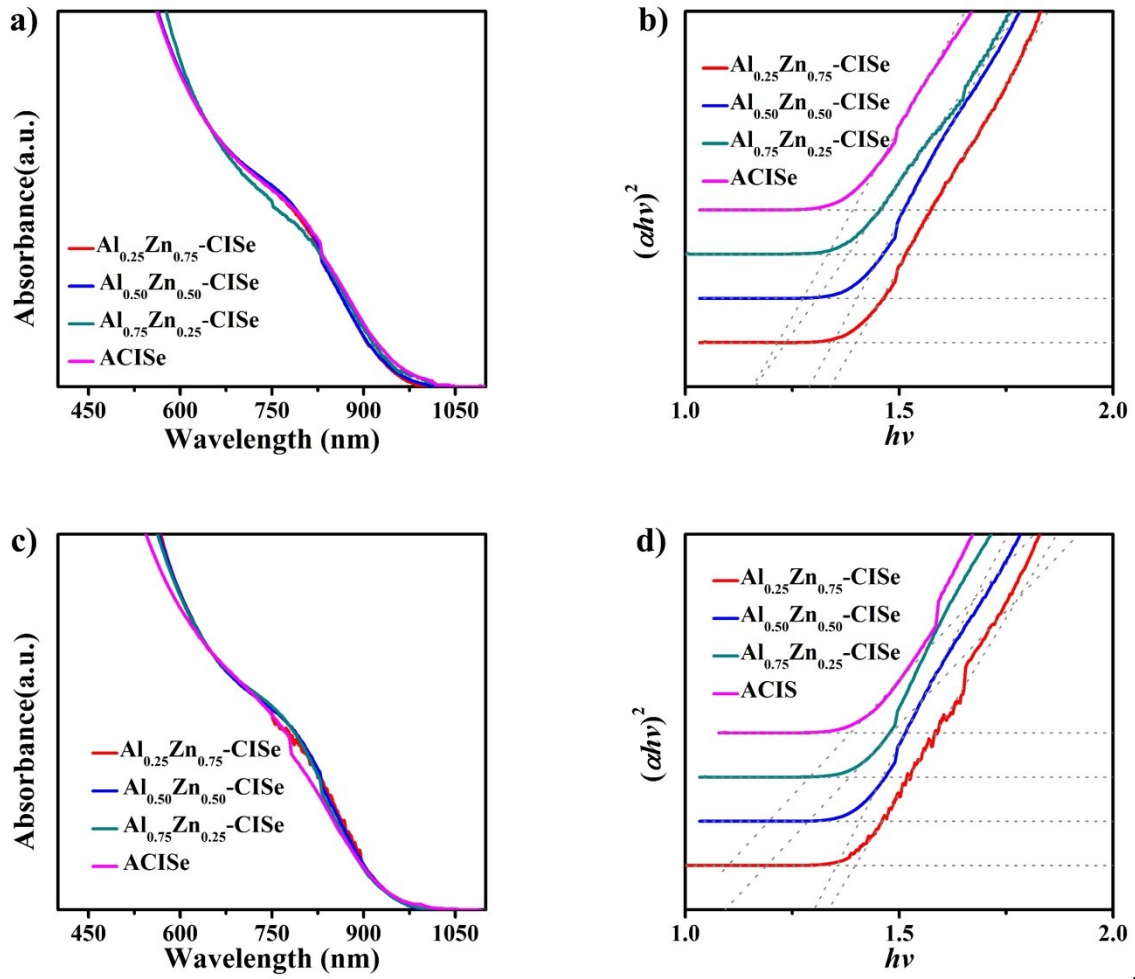
*E-mail: yli@ecust.edu.cn

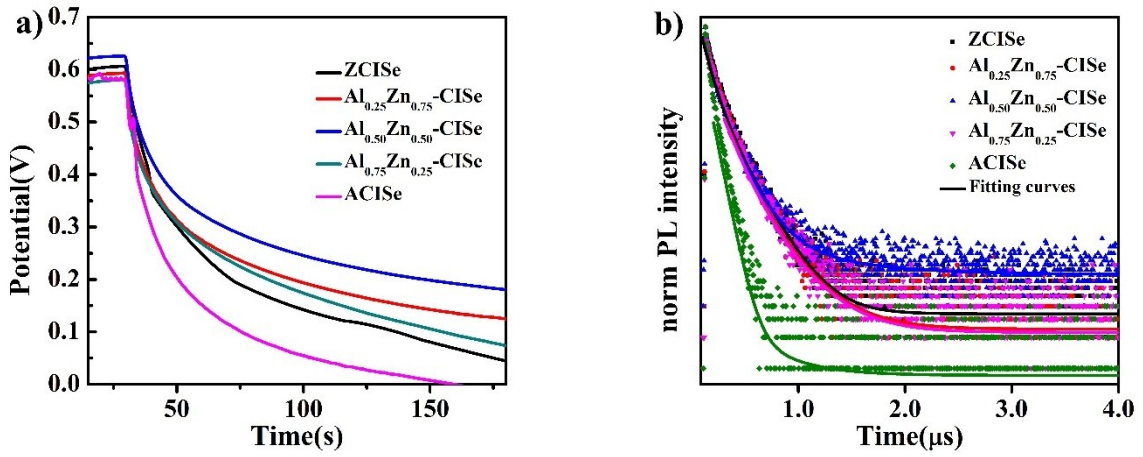**Figure S1.** XPS images of (Al_x/Zn_{1-x})-CISe QDs: a) Zn 2p peak and b) Al 2p peak.

Figure S2. (a) Estimation of the optical E_g from extrapolating the linear portion of the plot of $(\alpha h v)^2$ vs hv. UPS spectra of (Al_x/Zn_{1-x})-CISe QDs synthesized with various molar percentage of Al: (b) x = 0, (c) x = 0.25, (d) x = 0.50, (e) x = 0.75 and (f) x = 1.

Figure S3. Absorption spectra of (Al_x/Zn_{1-x})-CISe QDs synthesized with (a) $AlCl_3$ as Al precursor and (c) $Al(NO)_3$ as Al precursor. The estimation of the optical E_g of (Al_x/Zn_{1-x})-CISe QDs synthesized with (b) $AlCl_3$ as Al precursor and (d) $Al(NO)_3$ as Al precursor.

Table S1. The parameters of the optical E_g of (Al_x/Zn_{1-x})-CISe QDs with different precursors.

E_g	ZCISe	$Al_{0.25}Zn_{0.75}$-CISe	$Al_{0.50}Zn_{0.50}$-CISe	$Al_{0.75}Zn_{0.25}$-CISe	ACISe
$AlSt_3$		1.42	1.41	1.39	1.38
$AlCl_3$	1.44	1.41	1.41	1.38	1.39
$Al(NO)_3$		1.4	1.41	1.39	1.39

Figure S4. (a) V_{oc} decay curves of (Al_x/Zn_{1-x})-CISe QDs QDSCs based on a polysulfide electrolyte. (b) The time-resolved PL decay curves of (Al_x/Zn_{1-x})-CISe QDs.

Table S2. The fitting parameters of PL decay curves of (Al_x/Zn_{1-x})-CISe QDs.

Samples	τ_1 (ns)	Ratio$_1$ (%)	τ_2 (ns)	Ratio$_2$ (%)	τ_{ave} (ns)
ZCISe	99.63	50.50	251.33	49.50	174.72
$Al_{0.25}Zn_{0.75}$-CISe	154.17	57.18	333.58	42.82	230.99
$Al_{0.50}Zn_{0.50}$-CISe	184.11	78.24	694.63	21.76	295.20
$Al_{0.75}Zn_{0.25}$-CISe	144.49	56.85	324.98	43.15	222.37
ACISe	83.53	95.57	387.52	4.43	97.00