

Electronic Supplementary Information

Influence of Precursor Type in Non-Toxic Hybrid Inks for High-Efficiency $\text{Cu}_2\text{ZnSnS}_4$ Thin-Film Solar Cells

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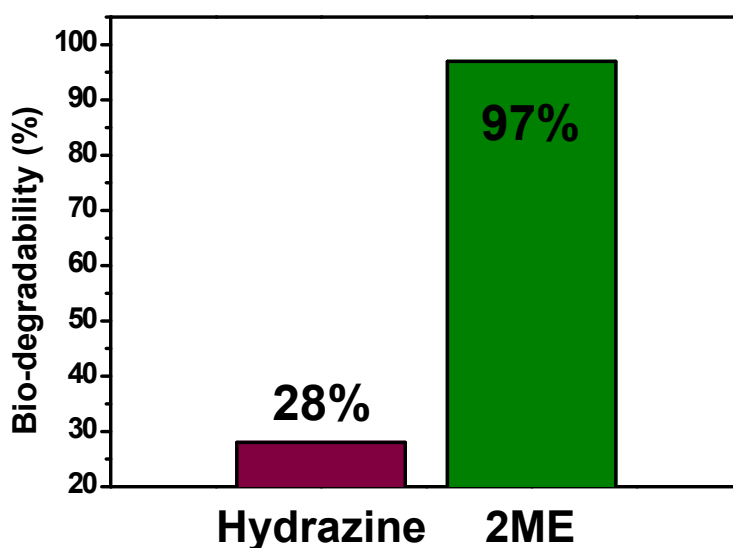


Figure S1. Bio-degradability value of 2-methoxyethanol (2ME) and hydrazine obtained from material safety data sheet (MSDS).^{1,2}

References

1. Material safety data sheet (MSDS) of 2-Methoxyethanol, No. M2327
2. Material safety data sheet (MSDS) of Hydrazine, No. 96265

Table S1. Variation of device performance for ZM and ZS hybrid-ink derived CZTS.

Sample type	J_{sc} (mAcm ⁻²)	V_{oc} (V)	Fill Factor (%)	Efficiency (%)	R_s ($\Omega \cdot \text{cm}^2$)	R_{sh} ($\Omega \cdot \text{cm}^2$)
ZM hybrid-ink derived film	26.73	0.56	54.03	8.09	2.84	1266.16
	26.62	0.57	55.59	8.15	2.81	1773.27
	26.89	0.56	55.41	8.12	2.92	1326.61
	27.56	0.54	53.82	8.01	3.01	1167.84
ZS hybrid-ink derived film	27.07	0.48	40.02	5.30	13.02	1546.21
	26.91	0.49	40.28	5.26	12.98	1498.25
	26.61	0.47	38.47	4.85	12.71	1364.02
	27.82	0.49	37.87	5.25	13.91	1298.44

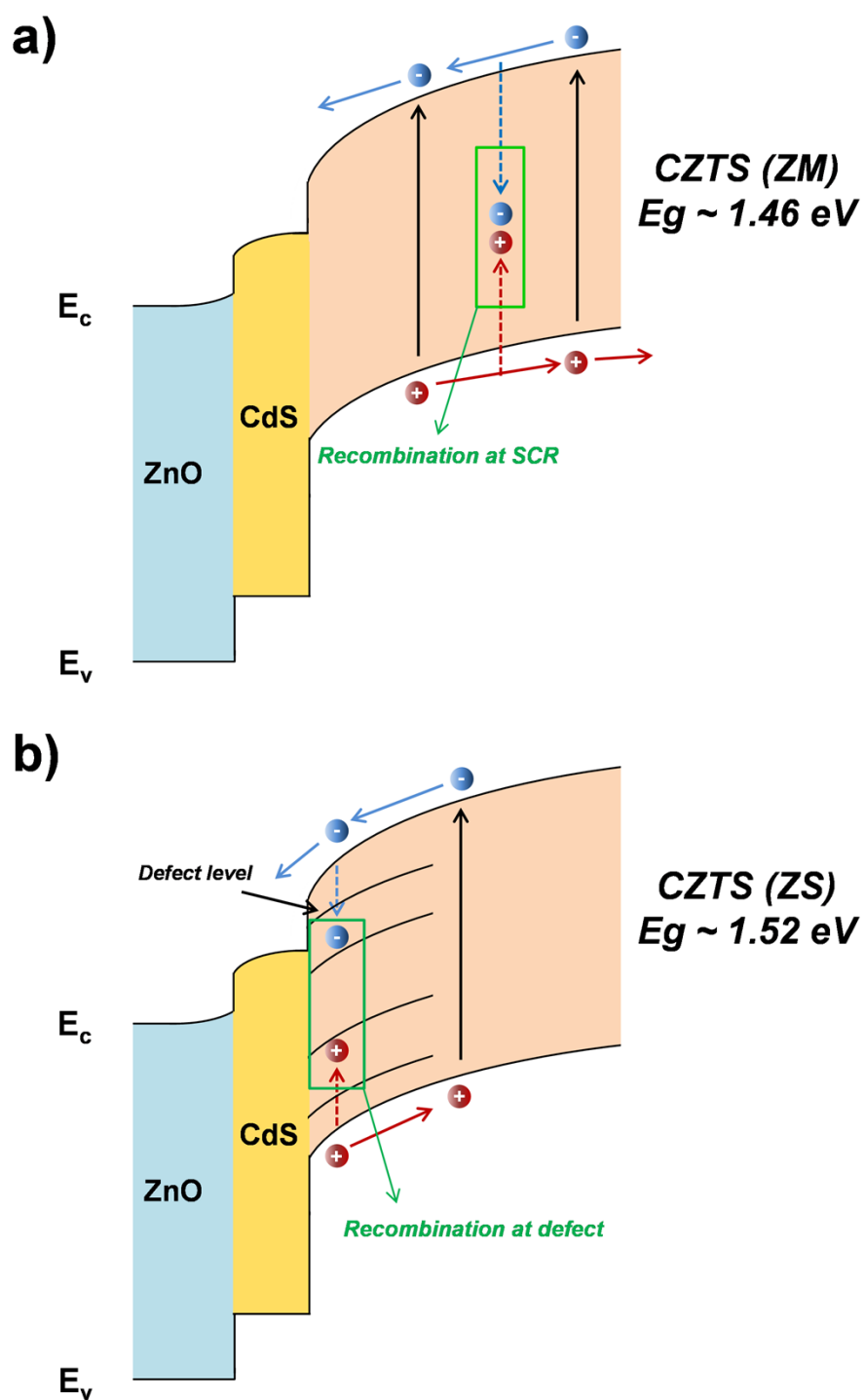


Figure S2. Energy level diagrams for a) ZM hybrid-ink derived CZTS and b) ZS hybrid-ink derived CZTS solar cells.