

Supporting information

Table S1 CIE, CCT and CCT regulation method of the QDs-based WLED device.

	Material	CIE	CCT/K	CCT regulation method	Ref.
1	AgInS/ZnS	(0.38, 0.38)	3823	non-tunable	[¹]
2	CdSe/ZnS QDs and acrylic acrylate oligomer	—	5600-14500	Adjust current density	[²]
3	Carbon Dots (CDs)	(0.31, 0.35)	3376-10803	Regulate sp ² domain sizes of CDs	[³]
4	CdSe/ZnS QDs and Carbon Quantum Dots (CQDs) in OSTE Polymer	—	4231-5478	Adjust the mass ratio of CdSe/ZnS QDs to OSTE	[⁴]
5	ZnMn:In ₂ S ₃	(0.34, 0.29)	2836 -6627	Change the voltage	this work

References:

1. C. Ting, H. Zehao, Q. Zhe, C. Yuanhong, X. Yanqiao, L. Jian and X. Zhixiang, *CIESC Journal*, 2022, **73**, 5167-5176.
2. C.-C. Chou, T.-L. Wang, W.-J. Chen and C.-H. Yang, *ACS Omega*, 2019, **4**, 3234-3243.
3. J. Shen, B. Xu, S. Chen, Y. Jia, J. Li, T. Jiang, Z. Gao, X. Wang, C. Zhu, H. Shi and Z. Wang, *ACS Sustainable Chemistry & Engineering*, 2022, **10**, 15599-15607.
4. Z. Peil, L. Mengmeng, W. Jialiang, L. Xiaotian, C. Xiaobing, GaoXiang and R. Linjiao, *Laser & Optoelectronics Progress*, 1-14.

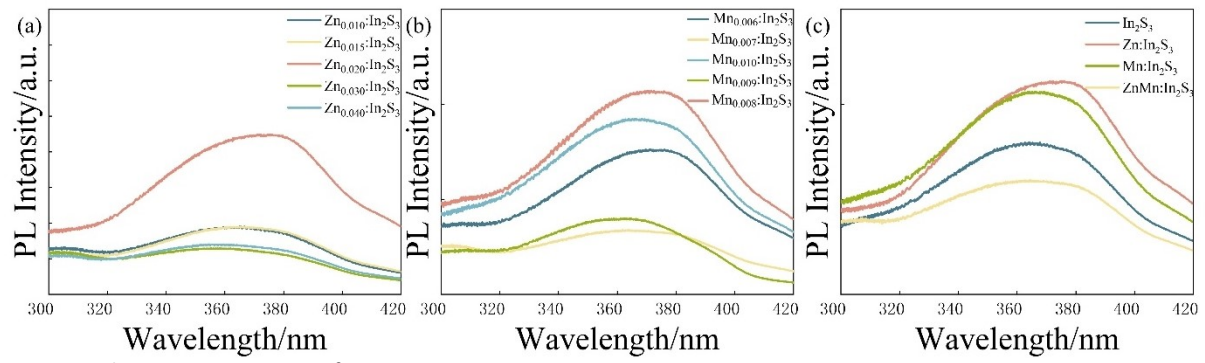


Fig S1 The excitation spectra of $\text{Zn}_x\text{Mn}_y:\text{In}_2\text{S}_3$

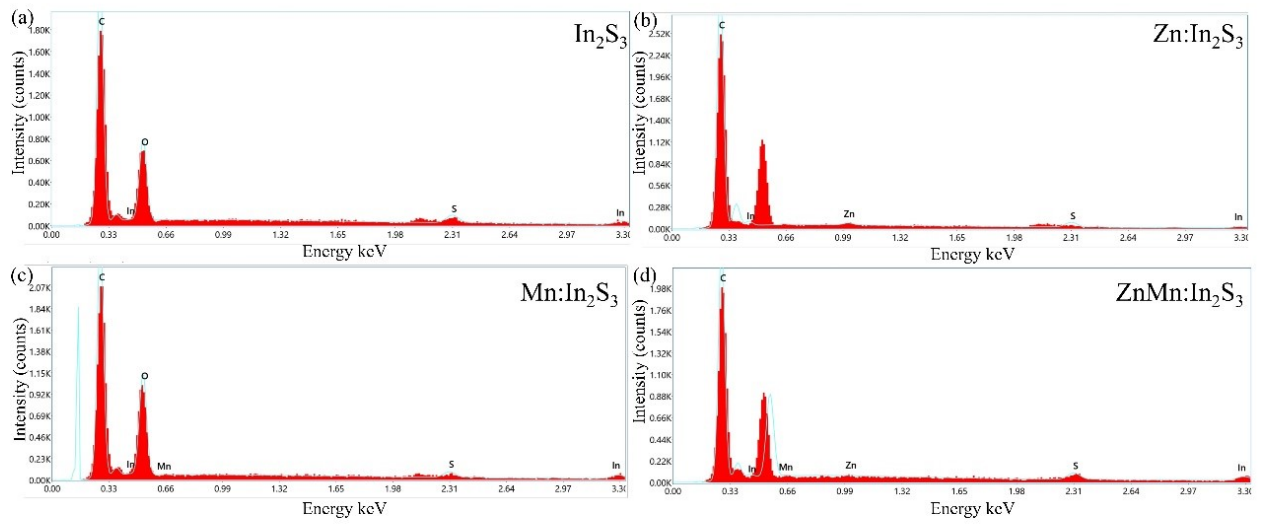


Fig S2 EDS spectra of In_2S_3 , $\text{Zn}:\text{In}_2\text{S}_3$, $\text{Mn}:\text{In}_2\text{S}_3$ and $\text{ZnMn}:\text{In}_2\text{S}_3$.