Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information for Journal of Materials Chemistry C

High-performance and environmentally friendly circularly polarized light direct detection based on ZnO nanowires and chiral cellulose nanocrystals

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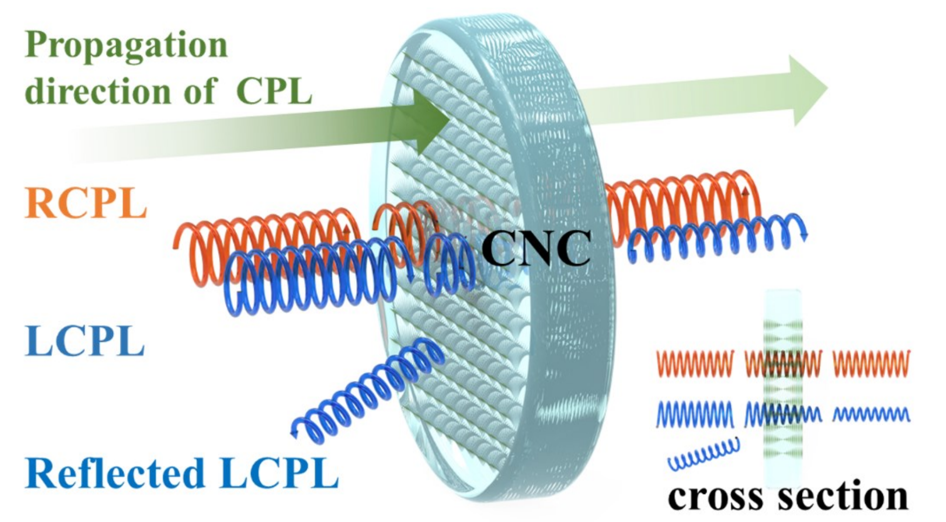

Figure S1 Schematic diagram of selective transmission of CNC film to CPL

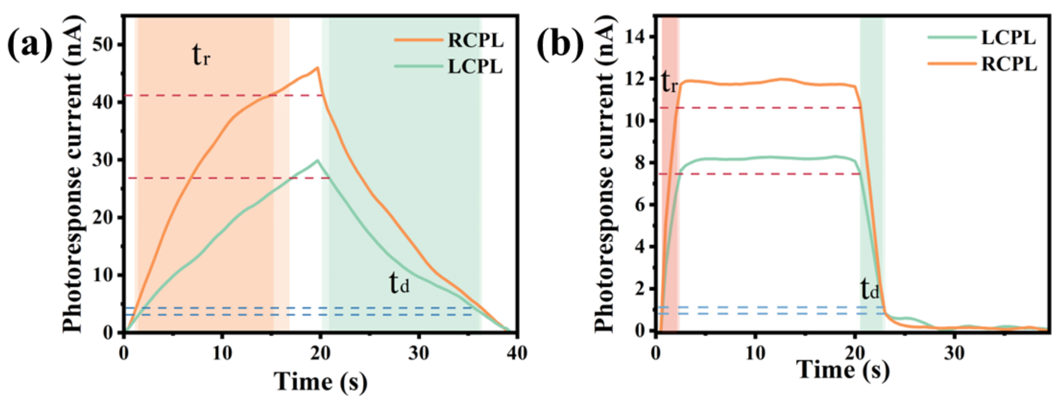

Figure S2 (a) Photoelectric response and recovery time of D1 detector (b) Photoelectric response and recovery time of D2 detector

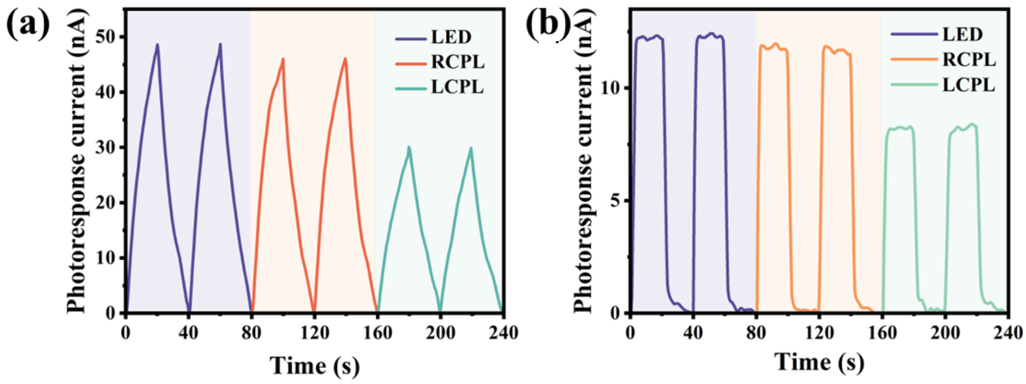

Figure S3 The photocurrent response of the detector under different light sources (a) D1 detector (b) D2 detector

Table S1 Summary of performance indicators of other CPL detectors

Materials	wavelength(nm)	P	R (A/W)	D* (Jones)	EQE (%)	g_{ph}	ref
ZnONWAs-PEDOT:PSS-CNC	365	3.65	0.58	1.29×10^{12}	69.42	0.36	This work
tetraindole-fused PDI 3a	730	2.5	0.45	2.1×10^{10}	89	0.01	1
0D chiral copper chloride hybrids	405	/	452	/	1.4×10^{5}	0.21	2
ClCPDI-Ph enantiomers	495	1×10^{7}	1200	2.9×10^{13}	3×10^{5}	0.13	3
P3CT/BN	375	/	5.4×10^{-4}	/	0.18	0.1	4
(R,R/(S,S)-ProSQ-C6:PCBM	543	/	0.21	/	47	0.09	5
chiral organic-inorganic hybrid (α-PEA)PbI3 perovskites	395	/	0.09	7.1×10^{11}	/	0.08	6
Quasi-2D chiral perovskites [(R)-β-MPA]2MAPb2I7	532	/	3.8	1.1×10^{12}	882	0.11	7
(S-α-PEA)2PbI4 (left) and (R-α-PEA)2PbI4 (right) chiral 2D-perovskite nanowires	505	/	47.1	1.24×10^{13}	/	0.15	8
quasi-2D chiral perovskites (R-, S-NEA)2(MA)n−1PbnI3n+1 films	405	/	15.7	/	4.8×10^{3}	0.15	9
CNC and TiO2 nanotube arrays	365	/	/	/	/	0.33	10
PM6:(S,S)-BTP-4Cl	830	/	0.4	$>10^{11}$	60	0.03	11
R-VPEA and S-VPEA perovskites	490	/	1.6	2.17×10^{13}	/	0.22	12

Note: The data selection in this table adopts the comprehensive optimal principle. Most of the data are derived from the measurement conditions when the asymmetry factor is the largest, and the missing parameters are marked with /.

Table S2 Summary of performance indicators of ZnO photodetector

Material	Wavelength(nm)	Response time(s)	Recovery time(s)	Reference
ZnONWAs	365	13.83	15.91	**This work**
ZnONWAs-PEDOT:PSS	365	1.53	2.28	**This work**
ZnO thin-film	325	35	90	[13]
ZnONWAs	365	28.5	60.3	[14]
ZnONWAs	390	23	33	[15]
ZnO porous-nanostructure	365	18	25.4	[16]
ZnO nanorods	365	17.3	6.4	[17]

1. L. Zhang, I. Song, J. Ahn, M. Han, M. Linares, M. Surin, H. J. Zhang, J. H. Oh and J. B. Lin, *NATURE COMMUNICATIONS*, 2021, **12**.
2. J. Hao, H. P. Lu, L. L. Mao, X. H. Chen, M. C. Beard and J. L. Blackburn, *ACS NANO*, 2021, **15**, 7608-7617.
3. X. Shang, I. Song, J. H. Lee, W. Choi, J. Ahn, H. Ohtsu, J. C. Kim, J. Y. Koo, S. K. Kwak and J. H. Oh, *ACS NANO*, 2020, **14**, 14146-14156.
4. N. Y. Kim, J. Kyhm, H. Han, S. J. Kim, J. Ahn, D. K. Hwang, H. W. Jang, B. K. Ju and J. A. Lim, *ADVANCED FUNCTIONAL MATERIALS*, 2019, **29**.
5. M. Schulz, F. Balzer, D. Scheunemann, O. Arteaga, A. Lutzen, S. C. J. Meskers and M. Schiek, *ADVANCED FUNCTIONAL MATERIALS*, 2019, **29**.
6. C. Chen, L. Gao, W. R. Gao, C. Y. Ge, X. Du, Z. Li, Y. Yang, G. D. Niu and J. Tang, *NATURE COMMUNICATIONS*, 2019, **10**.
7. L. Wang, Y. X. Xue, M. H. Cui, Y. M. Huang, H. Y. Xu, C. C. Qin, J. Yang, H. T. Dai and M. J. Yuan, *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*, 2020, **59**, 6442-6450.
8. Y. J. Zhao, Y. C. Qiu, J. G. Feng, J. H. Zhao, G. S. Chen, H. F. Gao, Y. Y. Zhao, L. Jiang and Y. C. Wu, *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*, 2021, **143**, 8437-8445.
9. T. J. Liu, W. D. Shi, W. D. Tang, Z. L. Liu, B. C. Schroeder, O. Fenwick and M. J. Fuchter, *ACS NANO*, 2022, **16**, 2682-2689.
10. Y. Y. Yu, S. X. Zhao, B. Y. Zhang, S. L. Han, M. Li, L. C. Zhao and L. M. Gao, *ACS APPLIED NANO MATERIALS*, 2022, **5**, 899-907.
11. L. X. Liu, Y. Yang, L. Y. Zhu, J. Q. Zhang, K. Chen and Z. X. Wei, *SMALL*, 2022, **18**.

12. Y. J. Zhao, X. Yin, Z. K. Gu, M. Yuan, J. P. Ma, T. L. Li, L. Jiang, Y. C. Wu and Y. L. Song, *ADVANCED FUNCTIONAL MATERIALS*, 2023, DOI: 10.1002/adfm.202306199.
13. A. Sarkar, N. Gogurla, B. N. S. Bhaktha and S. K. Ray, *MATERIALS RESEARCH EXPRESS*, 2016, **3**.
14. H. Makhlouf, C. Karam, A. Lamouchi, S. Tingry, P. Miele, R. Habchi, R. Chtourou and M. Bechelany, *Applied Surface Science*, 2018, **444**, 253-259.
15. C. Soci, A. Zhang, B. Xiang, S. A. Dayeh, D. P. R. Aplin, J. Park, X. Y. Bao, Y. H. Lo and D. Wang, *Nano Letters*, 2007, **7**, 137-143.
16. A. Soni and K. R. Mavani, *Scripta Materialia*, 2019, **162**, 24-27.
17. Y. Wan, S. Gao, L. Li, J. Zhang, H. Fan, S. Jiao, J. Wang, Q. Yu and D. Wang, *JOURNAL OF MATERIALS SCIENCE-MATERIALS IN ELECTRONICS*, 2017, **28**, 11172-11177.