Supporting information

Piezo-phototronic Enhanced Serrate-structured ZnO-based Heterojunction Photodetector for Optical Communication

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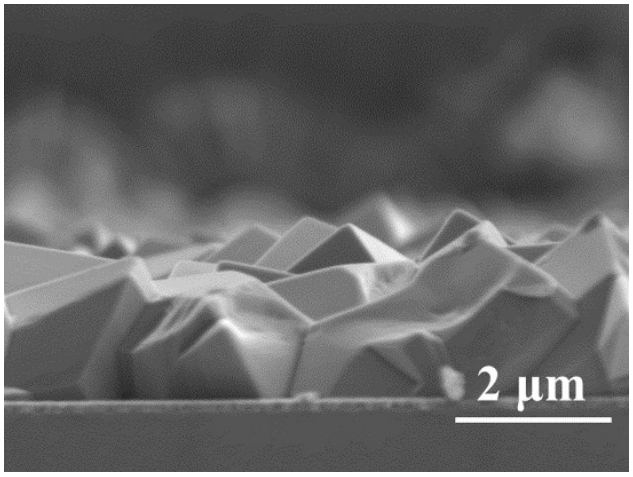

Fig. S1. The cross-sectional SEM image of the Cu_2O with the electrochemical deposition time of 1.0 h.

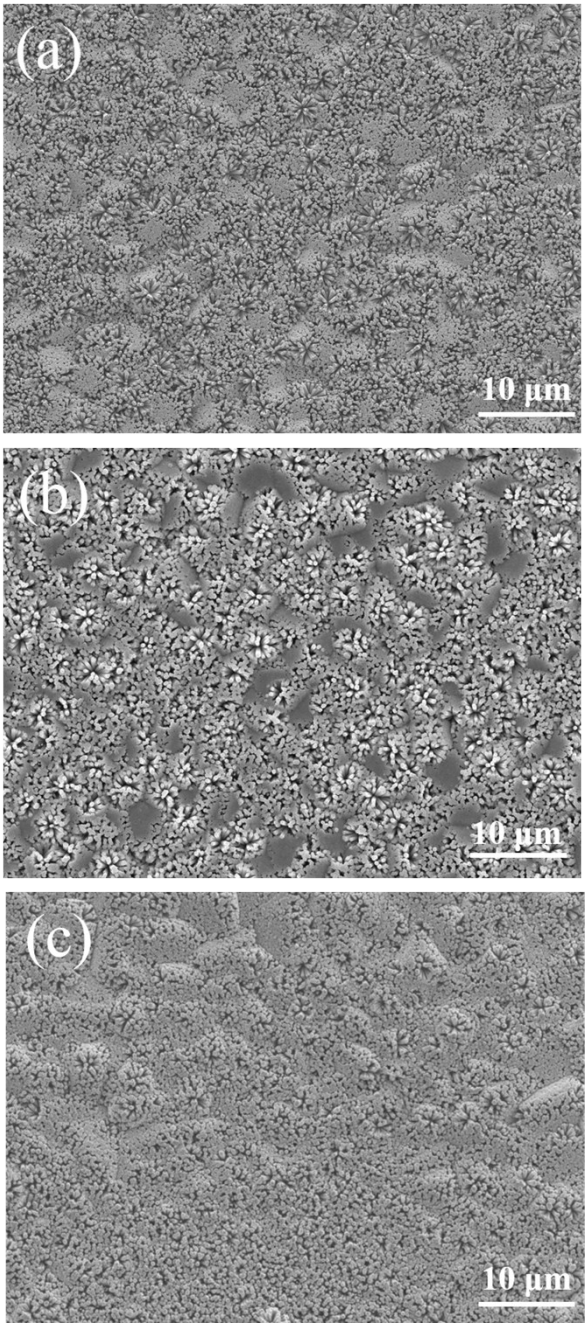

Fig. S2. The SEM images of ZnO nanorods synthesized on the surface of Cu_2O (a). 0.5 h, (b). 1.0 h, (c). 1.5 h

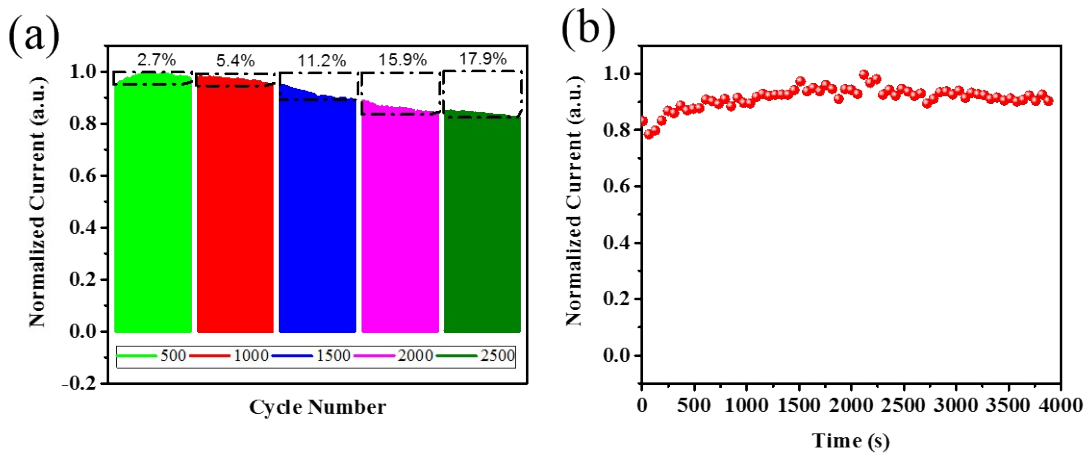

Fig. S3. (a) Photoresponse behaviors of the photodetector under a repetitive irradiation of more than 2500 cycles. (b) Photoresponse behaviors of the photodetector under long term radiation.

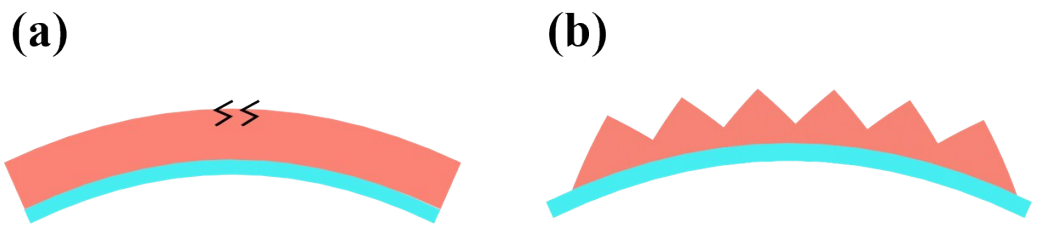

Fig. S4. The schematic diagram that serrate-structured design helps to improve stability

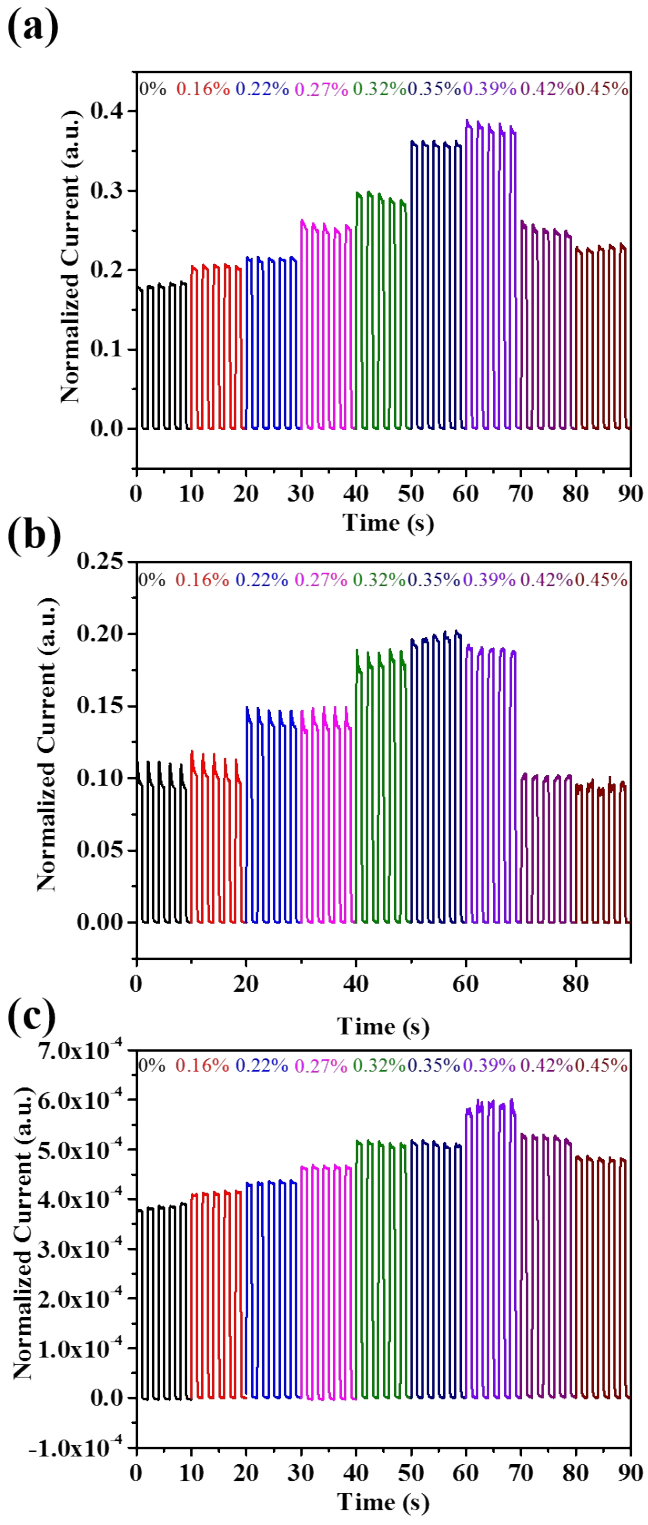

Fig. S5. The photoresponse behaviors of the photodetector with different strain **(a).** 450 nm, 1.77 mW/mm^2 **(b)**. 532 nm, 1.77 mW/mm^2 **(c).** 650 nm, 1.77 mW/mm^2

Table S1. The performance of ZnO-based photodetectors

Materials	Bias	Detection range	Dark current	Photocurrent	Rise time	Fall time	Reference
ZnO/Si	-2 V	442 nm	3.17 μA	131 μA	0.97 ms	1.30 ms	[1]
ZnO/Ga_2O_3	0 V	261 nm	＜1 nA	40 nA	＜0.3 s	＜0.3 s	[2]
ZnO/PEDOT	0 V	442 nm	-	65 nA	344.4 ms	320.5 ms	[3]
ZnO/PbS	10 V	350 nm	1 pA	550 pA	＜0.5 s	＜0.5 s	[4]
ZnO/Spiro-MeOTAD	0 V	365 nm	5 nA /cm^2	110 nA /cm^2	0.16 s	0.20 s	[5]
ZnO/Cu_2O	0 V	405 nm	＜20 nA	24.90 μA	1.6 ms	1.8 ms	This work

Table S2 Performance comparison between the SZCPs and 2D materials-based photodetectors

Materials	Bias	Detection range	Photocurrent	ON/OFF ratio	Rise time	Fall time	Reference
ZnO/Cu_2O	0 V	405 nm	24.90 μA	＞1000	1.6 ms	1.8 ms	This work
Black-phosphorus	0.2 V	640 nm	2 nA	＞1000	1 ms	4 ms	[6]
SnS_2	5 V	405 nm	＜100 pA	3.63	0.4 s	0.6 s	[7]
MoS_2	20 V	514 nm	0.1 nA	500	13 s	30 s	[8]
MoO_3	-	365 nm	25μA	2000	40 ms	-	[9]

Reference:

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