

Supplementary information

Microwave-Epoxy Assisted Hydrothermal Synthesis of CuO/ZnO Heterojunction: A Highly Versatile Route to Develop H₂S Gas Sensor

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Table S1: Gas sensing performance comparison between the developed CuO/ZnO nanocomposites with the state-of-art work in the similar field.

#	Materials ratio	Obtained morphology	Synthesis route	Operating temperature (°C)	H ₂ S Gas concentration (ppm)	Response	Ref. No.
1	CuO:ZnO = 4:1 by vol. %	Nanoparticles	Solvothermal	225	2	1035 %	33
2	CuO in ZnO = 3wt%	Nanorods	Two step-Hydrothermal	100	100	40 (Ra/Rg)	34
3	CuO in ZnO = 0.02 mol%	Hollow spheres	hydrothermal	336	5	13.3 (Ra/Rg)	35

4	$[\text{Cu}^{2+}]/[\text{Zn}^{2+}] = 0.005$	Honey comb template	colloidal template	225	10	380%	36
5	$[\text{Cu}^{2+}]/[\text{Zn}^{2+}] = 0.03$	Nanofibres	Electrospinning	150	10	4489 (Ra/Rg)	37
6	Cu 10 nm thickness coating on ZnO rods	Nanorods	Hydrothermal	200	10	40 (Ra/Rg)	38
7	Cu/Zn = 5.76 : 18.77	Porous flower-like CuO/ZnO nanostructures	Hydrothermal	220	100	25 (Ra/Rg)	39
8	Cu/ZnO = 2.5 mol%	Nanoparticles	Epoxide assisted Microwave Hydrothermal	250	25	94.28%	Present emphasis

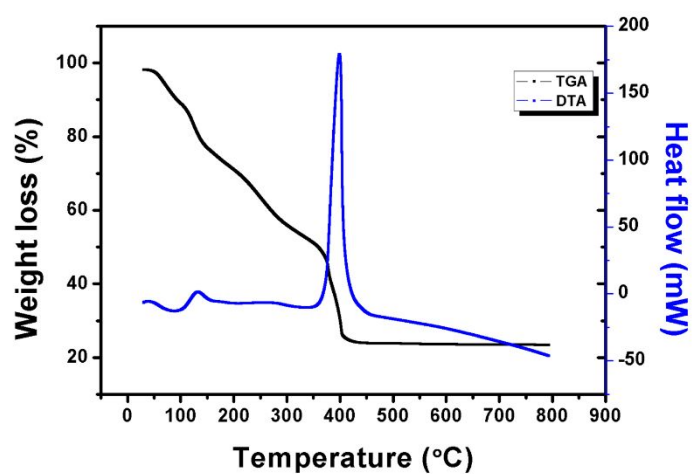


Figure S1. TG-DTA plot of sample ZC2 (2.5 mol% Cu doped ZnO)

Details of thixotropic paste formation and thereby thick films:

The thixotropic paste was formulated by mixing the developed powder with a temporary binder (ethyl cellulose and butyl carbotyl acetate). The ratio of inorganic to organic part was kept at 70:30 vol ratio in formulating the paste. The paste was transferred to screen printing mesh and applied on alumina substrates using squeegee. The as prepared thick films were dried at room temperature and then sintered at 400°C for 1h in air to remove the binder content.

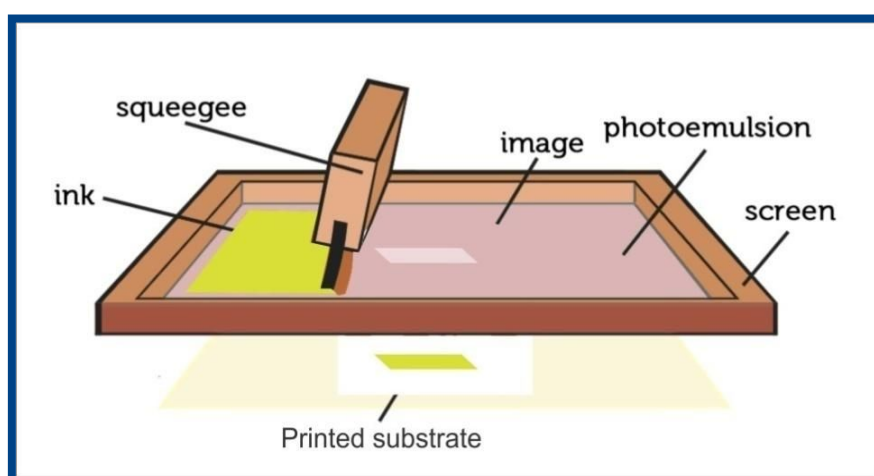


Figure S2. Schematic of screen printing technique

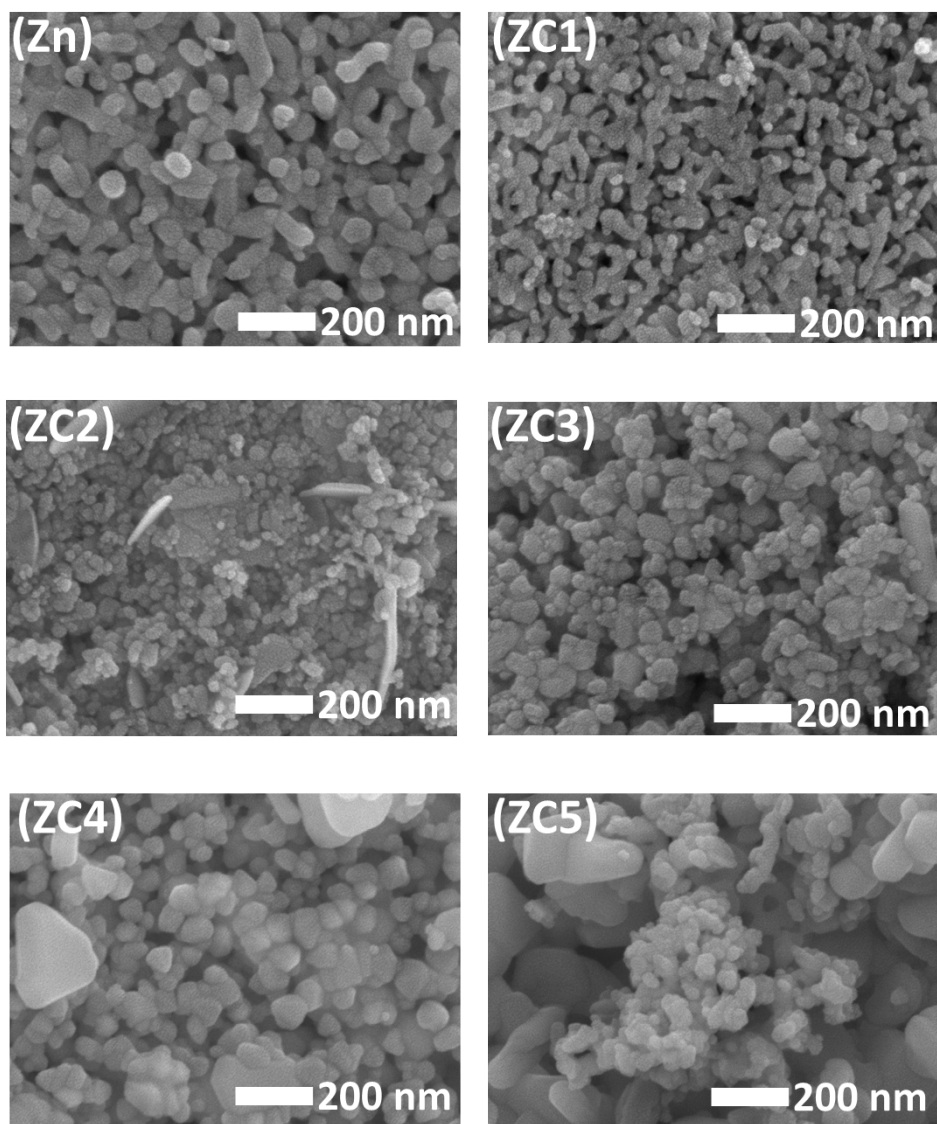


Figure S3. SEM images of the samples at various Cu doping levels (Zn-Pristine ZnO, ZC1- 1.25 mol% Cu, ZC2- 2.5 mol% Cu, ZC3- 5mol% Cu, ZC4- 7.5 mol% Cu, ZC5- 10 mol% Cu)

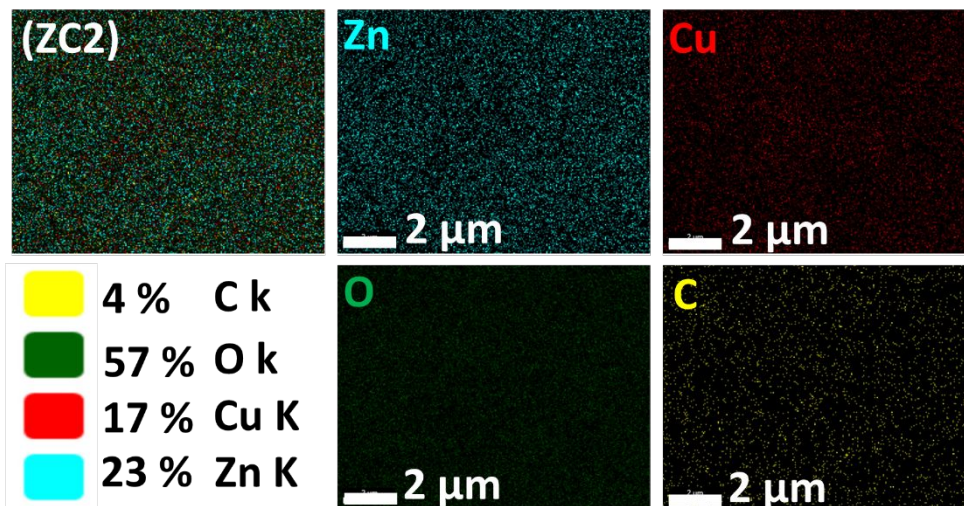


Figure S4. Elemental mapping of sample ZC2 (2.5 mol% Cu doped ZnO).

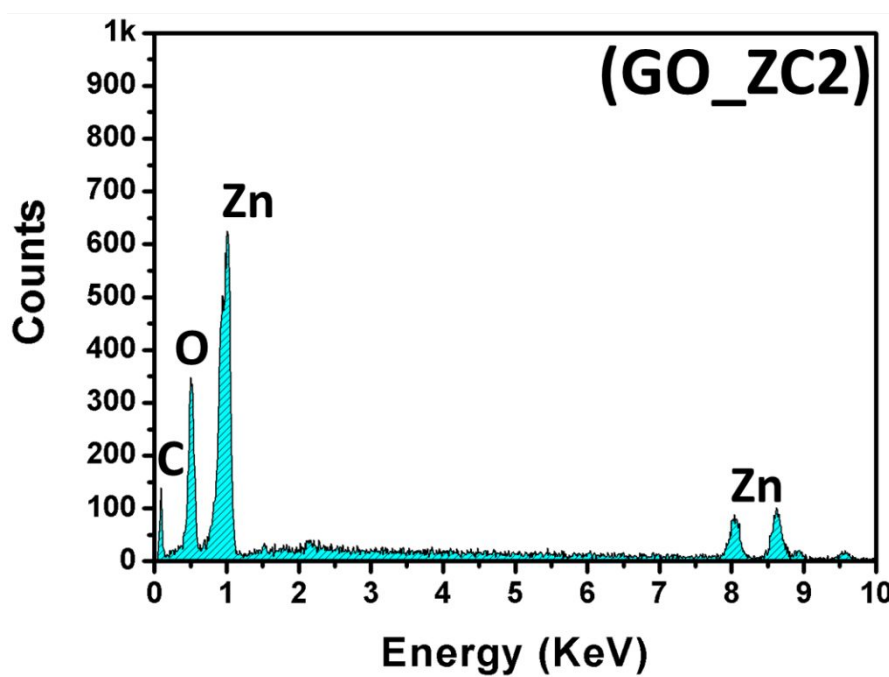


Figure S5. EDX spectra of sample ZC2 (2.5 mol% Cu doped ZnO).