

## Utilising problematic waste to detect toxic gas release in the environment: fabricating NiO doped CuO nanoflakes based ammonia sensor from e-waste

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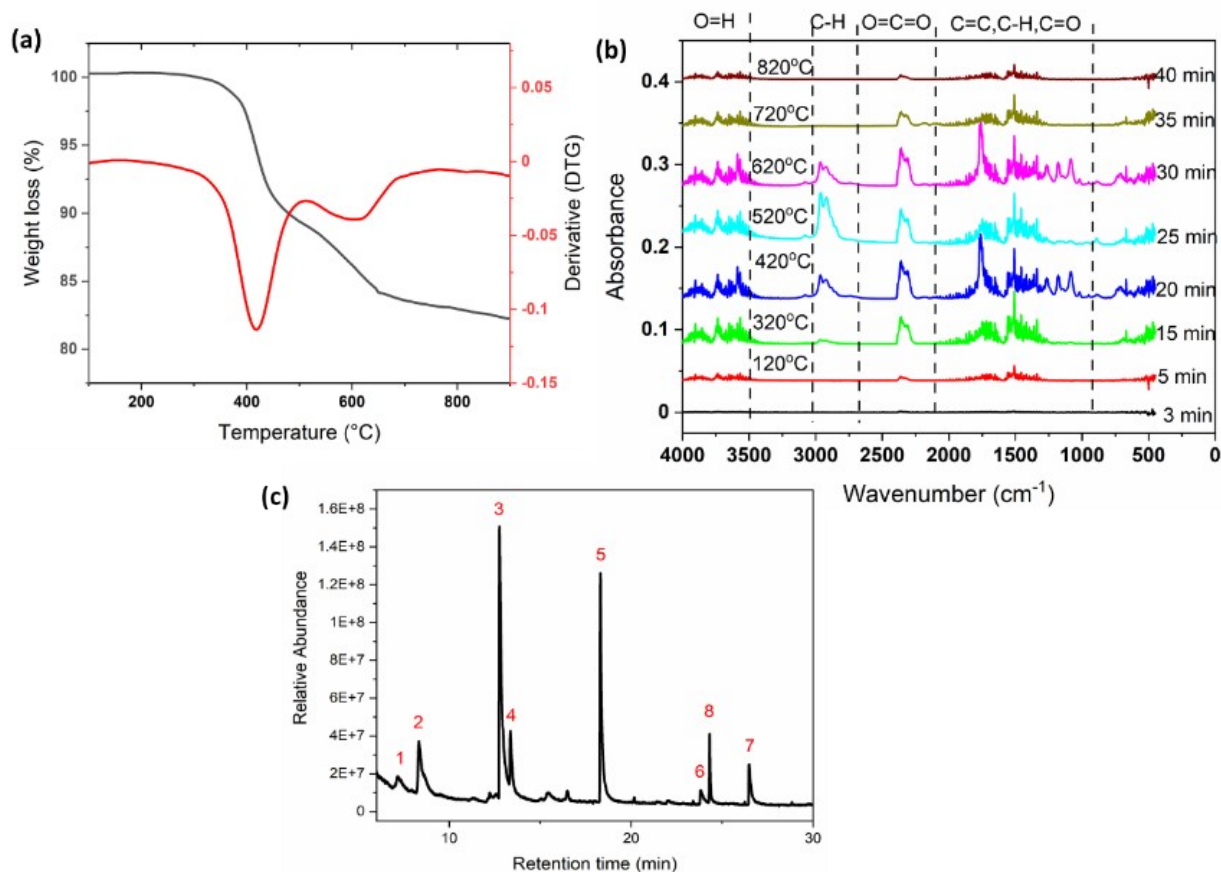
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### Supplementary:



**Figure S1.** (a) Thermogravimetric analysis with derivatives of the FPCB; (b) TGA-FTIR off-gas analysis of FPCB under different temperatures and time; (c) GC-MS analysis of the condensed gas from TDT (at 600°C).

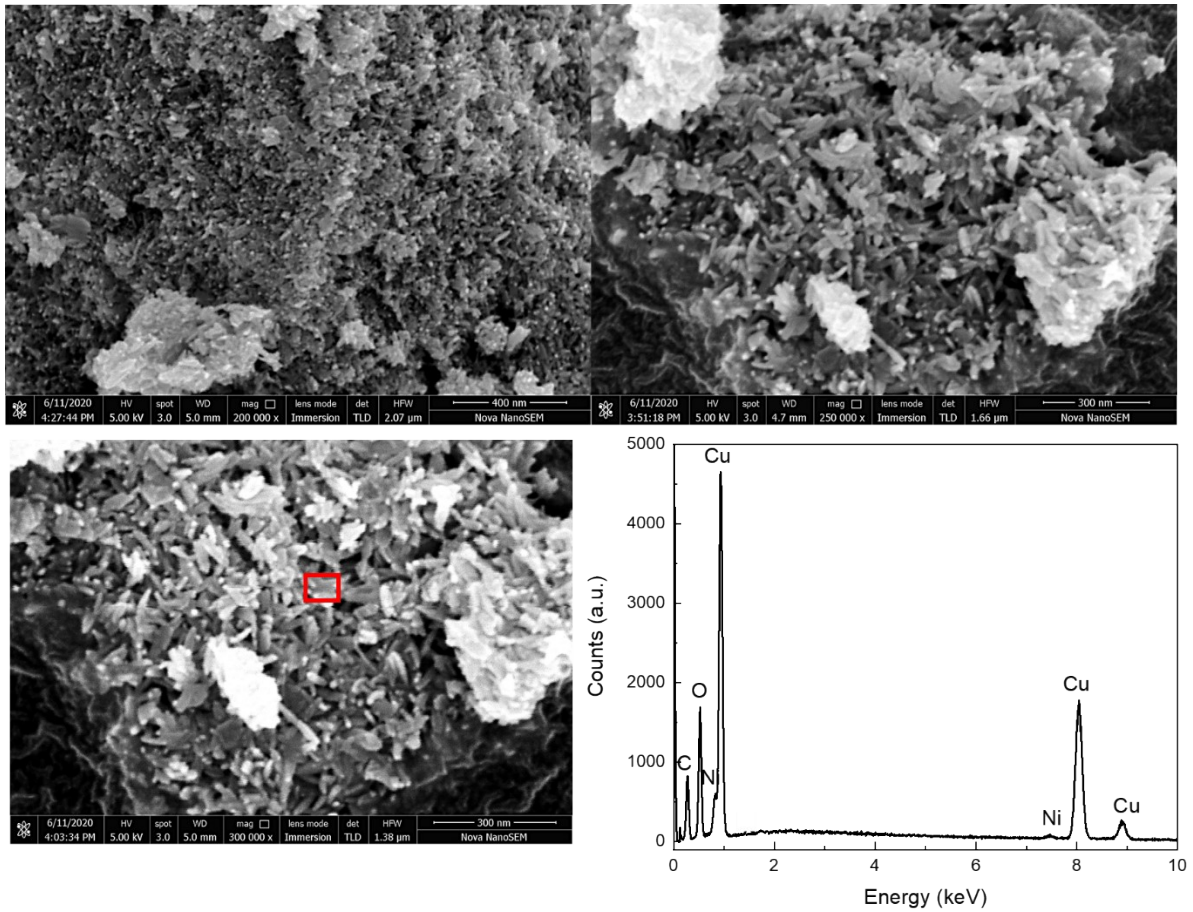
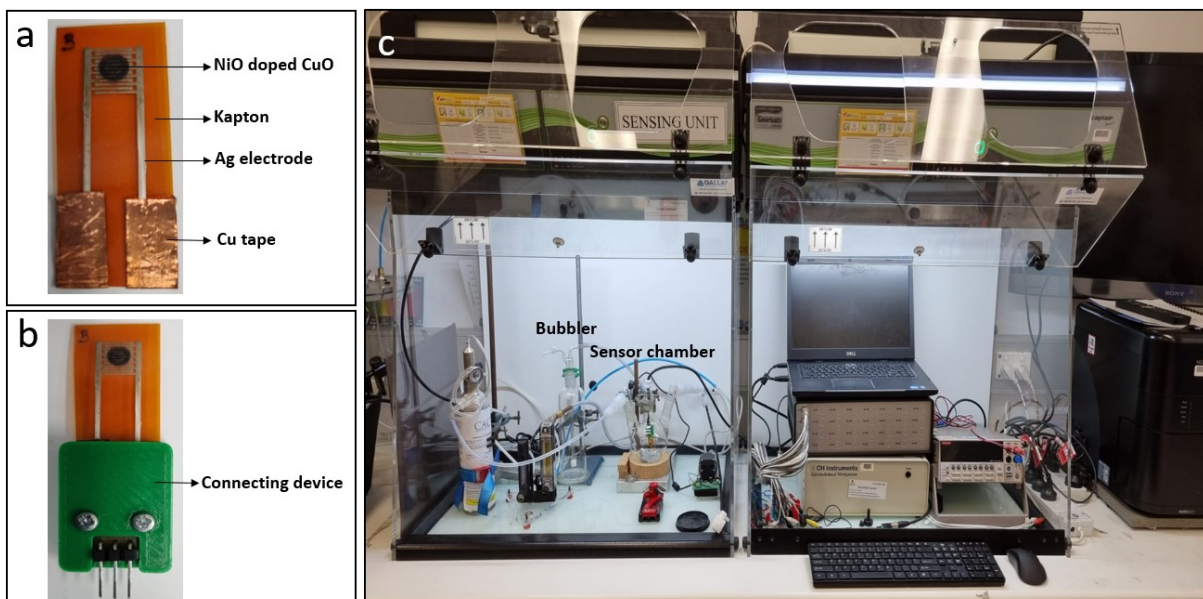


Figure S2. High resolution Secondary Electron Microscopy images and Energy Dispersive X-Ray Spectroscopy of the selected area from CuO nanoflakes.



**Figure S3.** Original image of (a), (b) NiO doped CuO based sensor, and (c) gas sensing setup for detecting NH<sub>3</sub> gas.

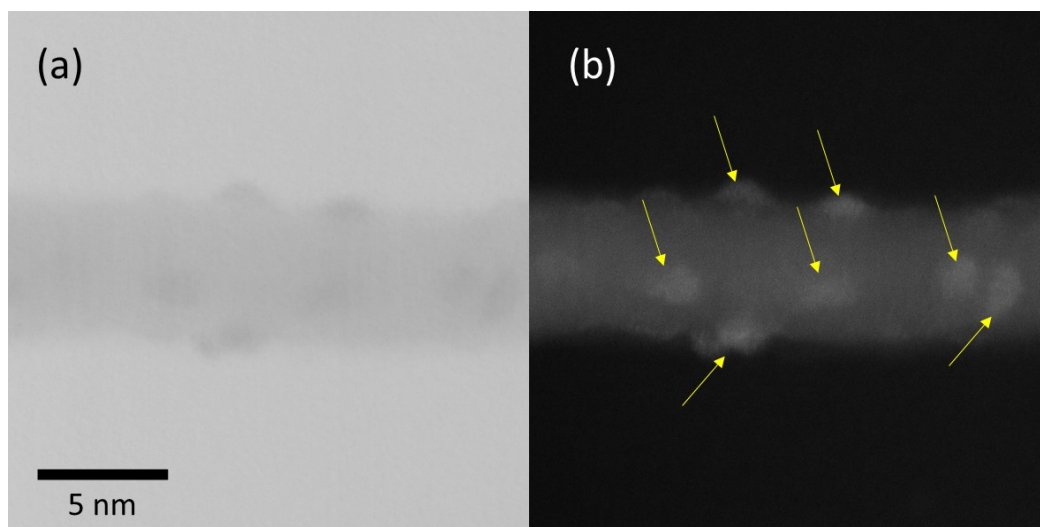


Figure S4. High-resolution STEM (a) bright-field and (b) dark-field images of the NiO doped CuO nanoflakes.

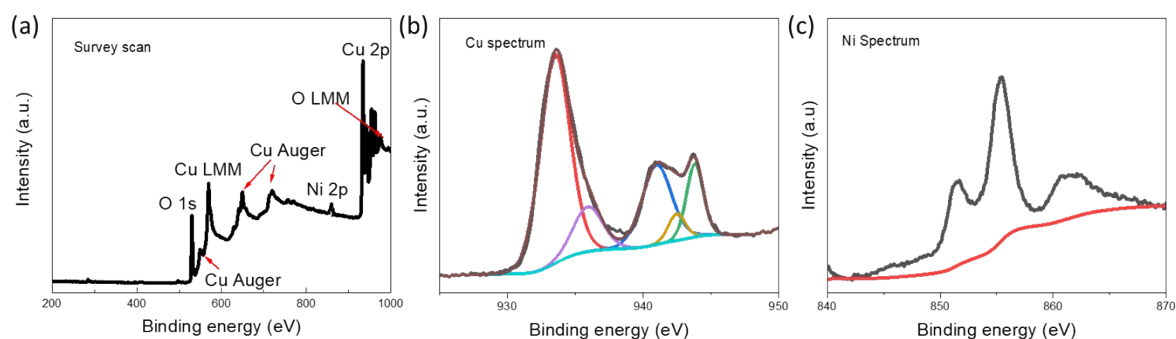


Figure S5: The XPS spectra of the nanoflakes. (a) Survey scan, (b) high resolution Cu spectrum, and (c) high resolution Ni Spectrum.

Table S1: Elemental analysis of the nanoflakes by ICP and XRF.

ICP		XRF	
Element	Wt%	Element	Wt%

Cu	96.05	Cu	95.11
Ni	3.51	Ni	4.40
Sn	0.01	Sn	0.01
Na	0.01	Na	0.01
Si	0.01	Si	0.01
Mg	0.01	Mg	0.001
Zn	0.002	Zn	0.004