

### ZnO@GO and ZnO@rGO field-effect transistors based multiple metal ions sensor

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Monitoring of metal ions is crucial because they can easily enter in living organisms through food chain and are highly toxic, non-biodegradable and bio-accumulative which might threaten to the wellbeing of humans, plants and animals. Herein, we report a novel approach for simultaneous, selective detection of harmful metal ions with ZnO@GO and ZnO@rGO based field-effect transistors (FETs). ZnO-NGs@GO and ZnO-NGs@rGO nanocomposites were prepared using graphene oxide (GO) or reduced graphene oxide (rGO) modified ZnO nanostructures via low temperature solution method. In our work, metal ions series ( $\text{Ni}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Cr}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Bi}^{2+}$ ) were detected and the fabricated FET sensor presented fast responses towards  $\text{Cr}^{2+}$  and  $\text{Cu}^{2+}$  ions with high sensitivity, good linear dynamic and low detection limits. The key feature of the FETs based sensor is an integrated approach of selective and simultaneous detection of metal ions. Thus, good sensing performance of the FETs based sensor presents a simple, low-cost, and convenient device for selective detection of multiple metal ions.