# Ultrasensitive RGO/Cu$_2$O film synthetized by hydrothermal method to detect NO$_2$ gas at room temperature

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**Abstract**

Advancing researches had been focused on incorporating RGO with metal oxidize to improve the gas-sensing sensitivity. In this paper, a neural-like RGO/Cu$_2$O composites was synthetized with a facile hydrothermal method. two crystalline morphology nanoparticles and nanowires existed as one integral morphology. The materials' ultrasensitive property could achieve nearly 35 % at 50 ppb NO$_2$ level at room temperature. Chemical reaction factors such as temperature, PH, ions concentration (reactant and reductant included) had been considered to influence morphologies and conductivities of products. Different characterization techniques, including TEM, FESEM, XRD, XPS, BET, Raman Spectrum, were employed to explore the sensing mechanism. In addition, gas sensing measurements of sensitivity, stability, repeatability and selectivity also be tested, which indicated the RGO/Cu$_2$O composites an excellent candidate for trace NO$_2$ detection with promising prospect.

**Key words:** reduced graphene oxide; cuprous oxide; nitrogen dioxide; room temperature;