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# Growth of CuO nanoneedles on graphene quantum dots as peroxidase mimics for sensitive colorimetric detection of hydrogen peroxide and glucose

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## Highlights

- GQDs/CuO nanocomposites are facilely fabricated by the growth of CuO nanoparticles on GQDs
- GQDs/CuO nanocomposites could be used as effective peroxidase mimics for the detection of H<sub>2</sub>O<sub>2</sub> and glucose
- Detection limit of GQDs/CuO nanocomposites for glucose is down to 0.59 μM

## Abstract

Graphene quantum dots-copper oxide nanocomposites (GQDs/CuO) are facilely fabricated by the growth of CuO nanoneedles on graphene quantum dots under mild conditions. The as-prepared GQDs/CuO nanocomposites could be used as an effective peroxidase mimics to catalyze the oxidation of 3,3',5,5'-tetramethylbenzidine (TMB) in the presence of H<sub>2</sub>O<sub>2</sub> to produce a blue-colored solution. Investigations on the mechanism indicate that the nature of peroxidase-like activity of GQDs/CuO nanocomposites originates from •OH radical generation. The increase of absorbance at 652 nm induced by the catalytic effect of GQDs/CuO nanocomposites offers accurate detection of H<sub>2</sub>O<sub>2</sub> in the range of 0.5 to 10 μM, along with a detection limit of 0.17 μM. A colorimetric method for serum glucose detection is also proposed by combining the GQDs/CuO catalytic reaction and the enzymatic oxidation

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