

# A Nonenzymatic Amperometric Glucose Sensor Based on a RuO<sub>2</sub>/Graphene Sheet Composite Electrode

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A nonenzymatic glucose sensor prepared from a mixture of ruthenium oxide (RuO<sub>2</sub>) and graphene (GR) sheet as a composite paste electrode (RuO<sub>2</sub>/GR CPE) was developed. The surface morphology and microstructure of the RuO<sub>2</sub>/GR CPE were studied by scanning electron microscopy, transmission electron microscopy and X-ray diffraction analyses. The RuO<sub>2</sub>/GR CPE was characterized by cyclic voltammetry, amperometry and electrochemical impedance spectroscopy. The RuO<sub>2</sub>/GR CPE displayed a synergism between RuO<sub>2</sub> and GR in during the electrocatalytic oxidation of glucose in 3 M NaOH. The formations of Ru(VI)/Ru(IV) and Ru(VII)/Ru(VI) redox couples and the remarkable physical properties of GR were the reasons behind this phenomenon. The RuO<sub>2</sub>/GR CPE had a linear response toward glucose over a concentration range of 0.1 to 22 mM with a detection limit of  $5.60 \pm 0.03 \mu\text{M}$  ( $S/N = 3$ ) and a sensitivity of  $78.4 \mu\text{A mM}^{-1} \text{cm}^{-2}$ . The sensor showed good stability and reproducibility. The RuO<sub>2</sub>/GR CPE was not affected by the traditional interferents of the glucose sensor, namely, ascorbic acid and uric acid.

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