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Hydrothermal Synthesis of Mesoporous Carbon Nanospheres and Their Electrochemical Properties for Glucose Detection

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Abstract : Mesoporous carbon nanospheres (MCNs) with uniform particle size distribution having an average of 290 nm and large specific surface area (274.4 m^2/g) were synthesized by a one-step hydrothermal method followed by the calcination process and then utilized as an enzyme-free glucose biosensor. Morphology, crystal structure, and porous nature of the synthesized nanospheres were characterized by scanning electron microscopy (SEM), X-Ray diffraction (XRD), and Brunauer–Emmett–Teller (BET) analysis, respectively. Also, the electrochemical performance of the MCNs@GCE electrode for the measurement of glucose concentration in alkaline media was investigated by electrochemical impedance spectroscopy (EIS), cyclic voltammetry (CV), and chronoamperometry (CA). MCNs@GCE electrode shows good sensing performance, including a rapid glucose oxidation response within 3.1 s, a wide linear range of 0.026-12 mM, a sensitivity of 212.34 $\mu A.mM^{-1}.cm^{-2}$, and a detection limit of 25.7 µM with excellent selectivity.

Keywords : biosensor, electrochemical, glucose, mesoporous carbon, non-enzymatic
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