Highly Sensitive Amperometric Sensor for the Determination of Glucose at Histidine Stabilized Copper Nanospheres Decorated Multi-Walled Carbon Nanotubes

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Uniform sized copper nanospheres (CuNSs) were deposited at functionalised multiwalled carbon nanotubes (f-MWCNTs) modified glassy carbon electrode (GCE) through a simple electrochemical method. Here, biomolecule (histidine) is used as stabilizing agent for the synthesis of copper nanospheres. The prepared nanocomposite was characterized by scanning electron microscopy (SEM), Energy-dispersive X-ray spectroscopy (EDX) and X-ray diffraction spectroscopy (XRD). The f-MWCNTs/CuNSs modified GCE exhibited a good electrocatalytic activity towards the determination of glucose. Our sensor showed a wide linear range from 10 μM to 6910 μM with LOD of 1.53 μM towards glucose. The sensitivity of our sensor is 1.39 $\mu\text{A}\mu\text{M}^{-1}\text{cm}^{-2}$. In addition, the sensor attained an appreciable stability, repeatability and reproducibility. Practicality of our sensor was demonstrated in the human serum samples. Simplicity, biocompatibility, cost effectiveness, and highly stability of electrode surface are the main advantages our fabricated modified electrode.

Keywords: Copper nanospheres, histidine, MWCNTs, glucose, practicality.

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