One Pot Synthesis of Cuprous Oxide Nanoparticles on Multi-Walled Carbon Nanotubes for Nonenzymatic Glucose Sensors

Yanjie Zhang¹, Xiangping Fu², Chunyan Wang^{3,*}, Shunbao Lu^{1,*}

¹ College of life sciences Jiangxi Normal University, Nanchang 330022, China;

² College of Foreign Languages, Jiangxi Agricultural University, Nanchang 330045, China;

³ East China University of Technology, Nanchang, 330013, China;

*E-mail: chywang9902@163.com, luxunbao8012@126.com

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In this paper, a nonenzymatic sensor for the detection of glucose was developed on the basis of multi-walled carbon nanotubes decorated by Cu₂O nanoparticles (Cu₂O@MWNT) as electrocatalysts. The nanocomposites (Cu₂O@MWNT) were successfully fabricated by a facile and effective polyvinyl pyrrolidone (PVP)-assisted hydrothermal reduction method. The resulting morphology and microstructure were characterized by TEM, XRD and XPS. The results confirm the high dispersion of Cu₂O nanoparticles were successfully anchored on MWNTs. Moreover, Cu₂O@MWNT which modified glassy carbon electrode (GCE) exhibits better nonenzymatic electrocatalytic responses to glucose in alkaline media. And the resulting sensor displays fast response (within 3s), wide linear range (from 2 μM to 1.35 mM), the detection limit is 0.72 μM (at signal/noise = 3) and high sensitivity and selectivity. The Cu₂O@MWNT nanohybrid films represent promising sensor materials for nonenzymatic glucose sensing in electrochemical analyses and other electrocatalytic applications.

Keywords: Synthesis; Nonenzymatic sensors; Cuprous oxide (Cu₂O) nanoparticles; Electrocatalysis

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