MWCNTs/MoS₂ Decorated Cobalt Oxide Polyhedrons Composite Film Modified Electrode for Electrochemical Determination of Dopamine in Rat Brain and Human Blood Serum Samples

Kogularasu Sakthivel¹, Mani Govindasamy¹, Shen-Ming Chen^{1,*}, Akilarasan Muthumariappan¹, Veerappan Mani^{1,2}, Tse-Wei Chen¹, Shanthi Selvaraj^{3,4}

¹ Department of Chemical Engineering and Biotechnology, National Taipei University of Technology, No.1, Section 3, Chung-Hsiao East Road, Taipei 106, Taiwan

² Institute of Biochemical and Biomedical Engineering, National Taipei University of Technology, No.1, Section 3, Chung-Hsiao East Road, Taipei 106, Taiwan

³ Research Institute of Electronics, Shizuoka University, Japan

⁴ Department of Physics and Nanotechnology, SRM University, India

*E-mail: smchen78@ms15.hinet.net

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MWCNTs/MoS₂ decorated Cobalt oxide polyhedrons (MWCNTs/MoS₂/Co₃O₄ PHs) were synthesized via facile hydrothermal route. The morphological study clearly revealed the MWCNTs/MoS₂ decorated on Co₃O₄ PHs and additionally elemental, and electrochemical studies were performed to verify the structure and shape. Owing to excellent synergy between MWCNTs/MoS₂ and Co₃O₄ PHs, the composite possesses good porosity, large electrochemical area, roughened surface, and excellent electrocatalytic ability. The development of highly sensitive sensor is essential for dopamine (DA) due to its great significance in physiological, biochemical, pharmaceutical and medicinal applications. A rapid, sensitive, selective, reproducible, and durable electrochemical non-enzymatic DA assay, by employing MWCNTs/MoS₂/Co₃O₄ PHs modified screen print carbon electrode (SPCE) was described. The sensor displayed outstanding sensitivity with nanomolar limit of detection of 13 nM, which is superior to those of previously reported Co₃O₄ based electrodes. A rapid, sensitive real-time analysis was demonstrated in rat brain and human blood serum samples.

Keywords: Co₃O₄ polyhedrons; Molybdenum disulfide; Multiwall Carbon Nanotubes; Analytical Chemistry; Non-enzymatic sensing; Biochemistry.

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