Novel Ginger-like Morphology of Barium Molybdate: A Promising Electrocatalyst for the Detection of Neurotransmitter Dopamine

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In this work, we have report a novel electrochemical sensor for the selective detection of dopamine (DA) based on ginger-like morphology of barium molybdate (BaMoO_4 ; BaM) modified screen printed carbon electrode (SPCE). The ginger-like BaM was prepared through a simple co-precipitation technique and its physiochemical properties were systematically investigated by various analytical and spectroscopic techniques such as X-ray diffraction (XRD), Raman, field emission-scanning electron microscopy (FE-SEM) and energy-dispersive X-ray spectroscopy (EDX). Furthermore, the as-prepared ginger-like BaM was effectively investigated for the sensitive and selective electrochemical determination of DA. The ginger-like BaM/SPCE shows a reversible electrochemical behavior with superior current response for DA detection. The BaM catalyst played a significant role to electrochemical detection of DA, as a results very low detection limit ($0.021 \mu\text{M}$), wide linear response range ($0.1\text{--}266 \mu\text{M}$), well sensitivity ($0.35 \mu\text{A} \mu\text{M}^{-1} \text{cm}^{-2}$) and good selectivity in the presence of common metal ions and biological compounds. This study provides a novel idea for the fabrication of binary metal oxides and their potential application in electrochemical sensor and biosensor.

Keywords: Binary metal oxide, Ginger-like, Barium molybdate, Neurotransmitter, Dopamine, Electrochemical sensor

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