Three-dimensional Hierarchical Structure NiFe Layered Double Hydroxides Nanosheets Based on Carbon Cloth for High Performance Non-Enzymatic Glucose Detection

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doi: 10.20964/2020.03.04

Received: 4 October 2019 / Accepted: 9 December 2019 / Published: 10 February 2020

The construction of non-precious metal nanomaterial with higher sensitivity and better selectivity is very important for glucose detection. In this paper, three-dimensional (3D) hierarchical layered double hydroxide (LDH) nanomaterials (CC@CCH NiFe LDH) are successfully synthesized by simple hydrothermal method. 1D basic cobalt carbonate (CCH) nanorods are preliminarily formed on the carbon cloth (CC), which acts as support, and then 2D NiFe LDH nanosheets are guided to deposit on the surface. Therefore, the hierarchical layered structure was obtained with high surface area and more active sites. The prepared CC@CCH NiFe LDH electrode material possesses excellent electrochemical catalytic oxidation performance. The test results show that the electrode material has high sensitivity ($6610 \mu\text{A} \cdot \text{mM}^{-1} \cdot \text{cm}^{-2}$), wide linear range (0.01-1 mM), fast current response ($< 10 \text{ s}$) and low detection limit (3 μM). Furthermore, the sensor material has good selectivity.

Keywords: Carbonized cotton cloth, 3D hierarchical layered structure, NiFe LDH nanosheets, non-enzymatic glucose detection

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