Short Communication

Electrochemical Behavior of Graphene/ZnO Nanoflowers Synthesized by an Efficient and Facile Two-Step Technique

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doi: 10.20964/2019.07.78

Received: 31 March 2019 / *Accepted:* 1 May 2019 / *Published:* 10 June 2019

An efficient and simple route was advanced to uniformly synthesize graphene/ZnO nanoflowers and an electrochemical impedance spectroscopy (EIS) technique was used to investigate the electrical properties. X-ray diffraction patterns indicated a broad and strong peak at 26° value, which conformed with the graphene (002) plane. A very strong Raman band appeared at 1,594 and 1,358 cm^{-1} , that corresponded to the independent G and D bands, respectively. The photoluminescence results show that the graphene/ZnO nanostructures has a lower electrons/holes recombination rate under UV light irradiation, that may be attributed to graphene sheets in graphene/ZnO nanoflowers becoming the separation mechanisms of the photogenerated electrons/holes. Cyclic voltammetry plots indicate approximately rectangular shape, showing perfect supercapacitive behavior. The charge transfer resistance in the graphene/ZnO nanoflower electrode is 175 $\text{k}\Omega$, which is considerably smaller than those of ZnO nanostructures (684 $\text{k}\Omega$) electrode, demonstrating the better conductivity in the graphene/ZnO nanoflower electrode. The graphene/ZnO nanoflowers showed excellent photocatalytic activity for the degradation of MB under the visible light which can be ascribed to the high absorption intensity of graphene/ZnO nanoflowers in visible light region.

Keywords: Graphene/ZnO nanoflowers; Electrochemical impedance spectroscopy; Cyclic voltammetry; Photoluminescence spectroscopy; Photocatalytic activity

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