Short Communication

Gold Nanoparticles Decorated on ZnONanorods/GCE for Enhanced Photocatalytic Degradation of Methylene Blue

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doi: 10.20964/2021.04.31

Received: 15 November 2020 / Accepted: 3 February 2021 / Published: 28 February 2021

Gold nanoparticles (Au NPs) decorated on ZnO nanorods (NRs) were synthesized via simple chemical bath deposition and thermal evaporation techniques on glassy carbon electrodes (GCE). The morphological, structural, photocatalyst and electrochemical properties of prepared samples were considered by FESEM, XRD, photodegradation and electrochemical analyses. FESEM results exhibited that high density and hexagonal wurtzite structure of Au NPs decorated on ZnO NRs were successfully synthesized on GCE substrate. The XRD analysis revealed the wurtzite structure of ZnO NRs and confirmed formation of Au NPs on ZnO NRs/GCE. The electrochemical studies indicated the specific capacitance enhancement of electric double-layer and conductivity improvement by Au NPs decorated on ZnO NRs. Photodegradation studies of methylene blue (MB) reveal that the degradation rate considerably was enhanced by Au NPs and the entire removal of MB was obtained after 60 min under sunlight irradiation. This considerable result can be related to the presence of Au NPs that reduced the recombination of photogenerated electron-hole pairs and the structural effect of one-dimensional ZnO NRs that enhance the light-harvesting ability. The photo-degradation kinetics and total percentage of photodegradation reveal that the photocatalytic activities of Au NPs-ZnO NRs/GCE was considerably higher with fast kinetic than that of ZnO NRs/GCE. It can be associated with a larger surface area of Au NPs-ZnO NRs compared to pure ZnO NRs.

Keywords: Gold nanoparticles; ZnONanorods; Photocatalytic degradation; Methylene blue; Electrochemical analysis

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