New Organic Bismuth Hydrangea Materials for Electrochemical Immunoassays Targeting Carcinoembryonic Antigen

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doi: 10.20964/2020.10.06

Received: 9 January 2020 / Accepted: 23 March 2020 / Published: 31 August 2020

In this work, new organic bismuth submicron hydrangeas (Bi-MEI SMHs) were synthesized for the first time by using 2-methylimidazole (MEI) as a ligand. The material has a porous hydrangea-like structure with large surface area, and exhibits excellent biocompatibility and extremely low toxicity. Bi-MEI SMHs with gold nanoparticles deposited on the outer surfaces were used for antibody capture, thus, providing a new label-free immunosensing platform to quantitatively detect carcinoembryonic antigen (CEA). The performance of the as-developed label free immunosensor was evaluated with different electrochemical techniques. Under optimal conditions, a good linear relationship between the peak current and CEA concentration was observed in a broad range from 1 ng mL⁻¹ to 900 ng mL⁻¹, with a calculated correlation coefficient and detection limit (S/N=3) of 0.9880 and 0.3 ng mL⁻¹, respectively. This work provides a new strategy of using organic bismuth materials to fabricate electrochemical immunosensors with promise in sensing platform applications.

Keywords: Organic bismuth materials; Bi-MEI; CEA; Electrochemical immunosensor

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