Supermolecule Functionalized Graphene and Application in Electrochemical Sensor

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In recent years, grapheme has attracted considerable attention on the horizon of material science because of remarkable and unique properties, such as excellent mechanical properties, high specific surface area, fascinating electronic transfer. Graphene as an ideal building block in nanocomposites are extensively applied in many scientific fields such as electrochemical sensors, energy storages, catalysis, and photonics.

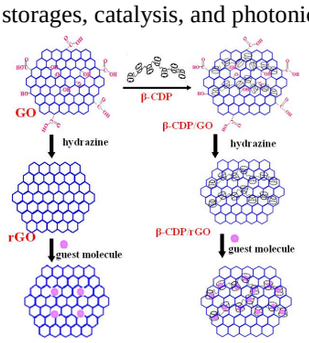

Figure 1. Schematic Diagram of the procedure for preparing β-CDP/rGO and rGO, and sensing the guest molecules by an electrochemical method.

In this paper, reduced-graphene oxide (rGO) modified with water-soluble β-cyclodextrin polymer (β-CDP) were successfully prepared by using a simple wet chemical strategy. The obtained β-CDP/rGO nanocomposites were characterized by Fourier transform infrared spectroscopy, static contact angle measurement, thermogravimetric analysis, scanning electron microscope and electrochemical impedance spectroscopy, which confirmed that β-CDP molecules had been effectively loaded onto the surface of rGO. β-CDP/rGO nanocomposites displayed the excellent water-dispersity and stability. More significantly, cyclic voltammetry and differential pulse voltammetry measurement showed that the β-CDP/rGO could exhibit high supramolecular recognition and enrichment capability, and consequently display excellent electrochemical response toward a pesticide-imidacloprid (IDP). As compared with various modified electrodes, β-CDP/rGO modified glassy carbon electrode exhibited an excellent electrochemical performance for IDP with wider of linear range and lower detection limit.

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