

Synergistic Effects of Graphene Based Nano Hybrid Materials for the Electrochemical Sensing Applications

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In recent years there has been increasing interest on graphene, graphene oxide based nano hybrid materials which could be applied for the various types of potential applications.^{1,2} Introducing nanostructured metal,³ metal oxide materials onto the graphene and graphene oxide framework shows obvious electrochemical response for the electrochemical sensing applications.⁴⁻⁷

Here, we will discuss about the possible ways to fabricate the graphene based nanomaterials using chemical synthesis and electrochemical deposition method. Electrochemical activity and synergistic effects of the graphene hybrid materials will be studied using voltammetry and electrochemical impedance analysis. These nano hybrid materials could be directly utilized for the electrochemical biosensing, such like detection of neurotransmitters, electrochemical reduction and oxidation reactions of chemically and biologically important compounds and fuel cell applications. Detection limit, sensitivity, selectivity and stability of these hybrid materials will be studied in detail which will lead to setup a new pathway to fabricate the prototype sensors. Also, a physics based two dimensional model with best representation of the electro-analytical experimental setup will be developed which will be used to predict species concentration and potential profiles.⁸ The model will be simulated for the experimental potential window to generate the current vs. voltage (I-V) curves.

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