Covalently Functionalized Hexagonal Boron Nitride Nanosheets : Efficient Electrochemical Sensor Biosystems

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ABSTRACT

In recent years have seen a surge of increased interest in the exfoliation of boron nitride (h-BN) due to its exciting electrical, thermal,photonics mechanical properties and sensing. Several approach to have emerged describing the exfoliation,functionalized and solubilization of h-BN. In this study, we report on a straightforward approach to modify the surface and its application as a new type of biomedical applications. The prepared product is structurally characterized by FTIR spectroscopy, field emission (FESEM), TGA technique, XPS spectrum, and BET surface area measurements. Nano- composites were immobilized on electrodes to detect the glucose,L-cysteine in buffer medium by cyclic voltammetry (CV), square wave voltammetry (SWV), and impedance spectroscopic (EIS). potential application of the covalent functionalization, cheap precursors, biodegradability and multifunctionality of high-performance composites boron nitride , they could be used for a wide range of the future biomedical applications.

Keywords: Boron nitride nanosheets, triazine azide, L-cysteine, Electrochemical Sensor

1. INTRODUCTION

Recently, more attention have seen a surge of interest in the exfoliation of graphene , other layered compounds, especially hexagonal boron nitride (h-BN) [1]. The h-BNNs considerably higher chemical stability and resistance to oxidation compared to that of graphene . Boron nitride (BN) is the isoelectric and isostructural analog to graphite with alternating boron and nitrogen atoms in the structure . Following these initial reports, several other methods such as mechanical exfoliation via etching, Lithium ion intercalation and lowenergy ball milling [2] were used to produce small quantities of high quality hBN nanosheets. Chemical exfoliation of hBN was later performed as an alternative to the mechanical routes, leading a simple and cost effective way for the bulk exfoliation of hBN nanosheets. These were performed by treating the bulk hBN powder in various organic solvents, [3] N,NDimethyformamide (DMF), methane

sulfonic acid (MSA), and molten metal hydroxides. These approaches yield low-concentration of hBN nanosheets even after extensive sonication. With the addition of functional groups triazine azide an improved dispersion and stability of hBN exists in a variety of solvents. Herein, we report the covalent chemical functionalization of h-BN nanosheets using