

## Synthesis of BDD/MWCNTs-RGO on tungsten wire for electrochemical applications

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The nanocomposite of boron doped diamond (BDD) deposited on multi-walled carbon nanotubes – reduced graphene oxide (MWCNTs-RGO) presents a great active area and high electron transfer kinetics, leading to reduction in over potential and high sensitivity [1,2]. In this study, we present a new approach for BDD/MWCNTs-RGO obtainment using tungsten wire as substrate. We have grown the carbon nanotubes on tungsten by thermal chemical vapor deposition using a tubular reactor. Camphor solution and Fe-Co were carbon and catalyst sources, respectively. Catalyst particles were deposited on tungsten wire by dip-coating method. We deposited the MWCNTs at 700°C for 10 minutes. For CNTs exfoliation, we applied hydrogen plasma at 10 Torr for 10 minutes. After, oxygen plasma treatment was carried out at 2 Torr for 30 seconds. % films were deposited in Hot Filament Chemical Vapour Deposition reactor. Morphological and structural analyses were performed using Scanning Electron Microscopy with Field Emission Gun (SEM-FEG), Raman Scattering Spectroscopy, Energy Dispersive X-Ray Spectroscopy (EDX) and cyclic voltammetry (CV). The CNTs exfoliation was observed in SEM micrographs. In Raman spectra, we notice an increase in D band intensity after exfoliation process. Electrochemical analyses showed that the BDD deposition decreased the capacitive current in comparison with flat substrates. Besides, an increase in electrochemical response of BDD/MWCNTs-RGO/W was observed. Therefore, this nanocomposite showed itself to be a promising alternative for electrochemical applications.

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- [2] S. Mohammadi, Z. Kolahdouz, and S. Mohajezadeh, *J. Mater. Chem. C* **1**, (2013) 1309.