

Carbon Nanotube/Ionic Liquid Bucky Gel Electrodes for an Application into Biosensor

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Herein, we report the immobilization of organophosphorus hydrolase (OPH) on multi-walled carbon nanotube (MWNT)/ionic liquid (IL) bucky gel electrodes for the application into biosensors. The MWNT/IL bucky gels were fabricated by grinding the mixture of MWNTs and 1-butyl-3-methylimidazolium tetrafluoroborate (BMimBF₄) ILs. After the immobilization of MWNT/IL gels on the cleaned gold surfaces, MWNT/IL/OPH electrodes were obtained by immersing the modified gold electrode into OPH-containing phosphate-buffered saline solution. The as-obtained MWNT/IL/OPH electrodes showed smooth and dense surface consisting of MWNT networks, as shown in SEM imaging. The electrochemical properties of pristine MWNT, MWNT/IL, MWNT/OPH, and MWNT/IL/OPH electrodes were characterized by cyclic voltammetry. The composite electrodes displayed the excellent electron transfer rate due to the synergistic promotion of MWNTs and ILs to electron transfer. Furthermore, these good interfacial characteristics of MWNT/IL/OPH electrodes lead to better electrochemical properties. Therefore, MWNT/IL/OPH electrodes with good electrocatalytic activity provide a useful platform for the development of biosensors.