

Polypyrrole/graphene composite films synthesized via potentiostatic deposition.

ABSTRACT

A one-step electrochemical process has been employed to synthesize composite films of polypyrrole/graphene (PPy/GR) by electrochemical polymerization on indium tin oxide (ITO) from an aqueous solution containing pyrrole monomer, graphene oxide (GO) nanosheets and sodium p-toluenesulfonate (NapTS). Thermogravimetric analysis (TGA) confirmed the formation of a composite; the degradation temperature of the new hybrid was between those of PPy and GO. Moreover, the bulbous surface of PPy and the almost transparent tissue-like GO nanosheets were replaced by the new appearance of the composite where the surface was flat but creased. As GO is nonconductive, we deduced that it had been reduced to conducting graphene in the composite film during the electrodeposition process, based on an electrical conductivity study measured with a four-point probe. On average, the electrical conductivity of the PPy/GR composites was twofold higher than that of the pure PPy film, indicating that the incorporation of graphene was able to enhance the conductivity of PPy film.

Keyword: Conducting polymers; Graphene; Electrochemistry; Composite.