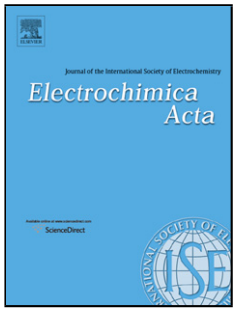

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Enhancement of the Electrochemical Performance of SWCNT dispersed in a Silica Sol-gel Matrix by Reactive Insertion of a Conducting Polymer.

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Abstract

The electroassisted encapsulation of Single-Walled Carbon Nanotubes was performed into silica matrices (SWCNT@SiO_2). This material was used as the host for the potentiostatic growth of polyaniline (PANI) to yield a hybrid nanocomposite electrode, which was then characterized by both electrochemical and imaging techniques. The electrochemical properties of the SWCNT@SiO_2-PANI composite material were tested against inorganic (Fe^{3+}/Fe^{2+}) and organic (dopamine) redox probes. It was observed that the electron transfer constants for the electrochemical reactions increased significantly when a dispersion of either SWCNT or PANI was carried out inside of the SiO_2 matrix. However, the best results were obtained when polyaniline was grown through the pores of the SWCNT@SiO_2 material. The enhanced reversibility of the redox reactions was ascribed to the synergy between the two electrocatalytic components (SWCNTs and PANI) of the composite material.

Keywords: PANI**,** SWCNT, Sol-gel silica, Hybrid nanocomposite