Evaluation of temperature and current density in the electrochemical synthesis of PANI/Carbon fiber composites

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Nowadays, due to the fast development of nanoscience and nanotechnology, great attention has been done to control synthesis of conductive polymers. Among different conducting polymers widely used, polyaniline (PANI) has been extensively studied owing to its vast application such as photovoltaics cell, thermoelectric, energy conversion, supercapacitor, lithium ion battery and so forth. In order to increase the electrical properties, different methods have been used to synthesize PANI, like chemical polymerization, emulsion, template synthesis, and electrochemical technique. The last one is considered a more environmental benign route to obtain PANI with good properties without involving large amounts of surfactants and oxidants species [1]. The performance of Pani directly depends on its structure. Thus, the elucidation of its properties with its morphology and structure is extremely important. In this context, considering the electrochemical synthesis, the aim of this work was to investigate the PANI deposition on carbon fiber (CF) substrate taking in account different experimental parameters such as, current density, temperature and time deposition. The PANI electrodeposition on CF1000 was performed under galvanostatic mode with current density of 1, 5 and 10 mA cm^2 during 6 and 12h in a 0.1 mol L^{-1} aniline + 0.5 mol L^{-1} H_2SO_4 aqueous solution. Moreover, the temperature of 0 and 70 ^oC was used. Different PANI morphologies was evaluated by Scanning Electronic Microscopy with field emission guns (SEM-FEG) whereas the structure by Raman spectra. The results showed high dependence of the current density and of the temperature in the PANI morphology, which is critical for further supercapacitor test.

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References:

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