Effect of the substrate annealing treatment in the electrochemical performance of the PAni/CF binary composites

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Recently, great attention has been demonstrated to based-conducting-polymers system due to wide range scientific and technological applications. Polyaniline (PAni) is one of the most investigated and commercialized conducting-polymers, since that it can be easily synthesized, the monomer presents low cost and the polymer presents good stability. Polyacrylonitrile (PAN) based activated carbon cloth to use as substrate for obtain porous electrode in electric double layer capacitors is generally used. The structure of pores of the carbon electrode affects the performance of the capacitors [1]. Thus, the synthesis and characterization of binary composites produced from carbon fibers (CFs) and PAni represent a good contribution considering the singular properties of both materials. CFs produced at different heat treatment temperatures (HTT) of 1000, 1500 and 2000 ºC were used as substrates to obtain binary composites from PAni chemically deposited. The SEM images showed carbon fiber substrates uniformly enwrapped with PAni. Raman and XPS analysis presented characteristic of the emeraldine salt form, indicating a good conducting of the polymer on the substrates. The PAni/CF composites were electrochemically characterized by cyclic voltammetry (CV), and charge/discharge tests. The CV curves are characterized by a rectangular shape, which indicates the capacitance characteristic of CF based on the electrical double-layer capacitance for all electrodes studied. The PAni/CF-1000 presented the highest current density, promoting large charge accumulation and favoring the capacitive behavior. The charge and discharge curves were almost linear with similar profile of the conventional symmetric capacitor. This indicates a good electrochemical stability and reversibility of the electrodes studied.

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References:

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