Electrodeposition of Nickel on Activated Carbon Fiber Felts Produced from Textile Polyacrylonitrile

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Activated carbon fibers (ACFs) have special characteristics when compared with common activated carbons (granular or powder) because they show well-defined pore structures which provide a high specific surface area. Based on these considerations, this work has as objective the preparation and characterization of nickel (Ni) by electrodeposition on ACF felts and apply the activated carbon fiber coated with nickel as electromagnetic radiation reflector. In particular, the Ni-coated carbon fibers have been widely applied to miniature capacitor of large capacitance, magnetic film and many types of functional devices. Specifically, in this work, our studies were focused on obtaining Ni-coated carbon fiber felts as composite materials for applications as electromagnetic radiation reflector. Ni coating has been obtained from different methodologies, however the electrodeposition has a key role in order to obtain nickel coatings that can be deposited and controlled with good accuracy due to the greater control of the practical operations. For electrodeposition of Ni, the electroplating parameters were optimized to obtain high quality composites. The Ni- coated ACF felts were prepared using a plating bath containing 0.1 M $NiSO_4$ + 0.56 M H_3BO_3. The composites were characterized by scanning electronic microscopy (SEM), Raman spectroscopy and X-ray diffraction (XRD) analysis. From Ni-coated ACF felts SEM images was possible to observe the thickness of the nickel layer deposited on the carbon fiber at different current densities. The XRD analysis revealed that Ni coatings are composed of Ni pure metallic. The results of the reflectivity measurements show it was possible to obtain a maximum reflection of 95% of electromagnetic radiation incident on the FCA nickel coverage in the frequency range of 8-12GHz.