

ELECTRICAL PROPERTIES OF Cr-DOPED POLYANILINE/POLY(VINYLALCOHOL) BLENDS

D. A.W. Soares¹, P. H. O. de Souza¹, O.Z. Higa², R. M. Rubinger¹,
A.A.A. de Queiroz¹

¹Departamento de Física e Química, Instituto de Ciências - Universidade Federal de Itajubá Campus José Rodrigues Seabra, Av. BPS, 1303, 37500-903, Itajubá – Minas Gerais – Brazil.

²Laboratório de Biologia Molecular, ²Instituto de Pesquisas Energéticas e Nucleares, IPEN-USP.

Polyaniline (PANI) and their charge transfer complexes are engineering materials that continue to attract considerable attention from engineers due to its unique electrochemical behavior, environmental stability and high degree of processability. Extensive works on the preparation of electrically conductive PANI blends containing a polymeric matrix having desirable physical and good mechanical characteristics have pointed as a promising route to overcome the PANI intractabilities. This paper reports the electrical properties of the dichromated PANI/poly(vinylalcohol) (PANI:Cr⁺³/PVA) blends. Doped polyaniline powder in the emeraldine base form was synthesized by the classical chemical oxidation of aniline with ammonium persulfate as the oxidant in the presence of chromium (Cr⁺³). Annealed PANI:Cr⁺³/PVA was obtained by heating rate of 10°C/min and cooling rate of 5°C/min [1]. The FTIR spectroscopy revealed a structural change of both shape and intensity of the polyaniline bands after doping with chromium indicating the formation of a charge transfer complex. The SEM (Phillips XL 30) was used to understand the changes occurring in the conductivity to a microstructure level. The distribution of PANI:Cr⁺³ (50% w/w) in the host polymer (PVA) show some tendency to occur in "floculated structures". The samples were cut into circular shapes to form films about 500 microns thick. Electrical contacts were made with graphite adhesive [2] and the electrical d.c. measurements were done using a Keithley 237 Source Measurement Unit. We have carried out current voltage (I(V)) measurements and we inferred a capacitance about 1 nF when the resistivity was so large as 1 GΩ.cm. So we have carried out capacitance-voltage (C(V)) and current voltage (I(V)) measurements in a a.c. mode. Our results indicate nonlinear behavior in the PANI:Cr⁺³/PVA blends. We expect, through C(V) measurements to obtain sample parameters such as dielectric constant and Schottky-type barrier height[3]. Also, from the dependence of the sample conductivity with temperature it is possible to infer the dominant conduction mechanism, i.e. band-trap activation energy, nearest neighbor and variable range hopping[4,5].

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