

ELECTRICAL CONDUCTIVITY, DIELECTRIC BEHAVIOR AND HUMIDITY SENSING PROPERTIES OF POLYANILINE-GRAPHITE OXIDE COMPOSITES

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ABSTRACT

Composites of polyaniline (PANI)-graphite oxide (GO) were synthesized by a single-step in-situ chemical polymerization of aniline over fine graded powder of GO. The composite formation and the structural changes were analyzed by scanning electron microscopy (SEM), X-ray diffraction (XRD), and Fourier transform infra red spectroscopy (FTIR). The DC conductivity of the composite has been investigated within a temperature range from 300 K to 433 K and the temperature dependent conductivity exhibited semiconducting behavior. Room temperature AC conductivity and dielectric behavior of the composites were studied in the low frequency range of 50 Hz to 5 MHz. Variation of AC conductivity obeyed the power law and the dielectric response showed relaxation contribution coupled by electrode polarization effect. Humidity sensing properties of the composites were studied using a self-fabricated sensor set up. The electrical resistance as a function of varying humid environment ranging between 20 and 90 % relative humidity (RH)) is recorded to evaluate the sensitivity of the PANI-GO composite samples towards humidity. The resistance of the samples was found to decrease with increasing humidity due to absorption of water molecules which provides the better conducting paths. Composite with 50 wt% of GO has shown better sensor response than lower loading of GO particles in the polyaniline matrix. Our observations suggest that the PANI-GO composites are potential materials for humidity sensors.

KEYWORDS: Polyaniline, Graphite Oxide, Composites, Conductivity, Humidity Sensing