

**Dielectric relaxation and ac conductivity of nano sized polyaniline-cobalt oxide composites**Narsimha Parvatikar<sup>1</sup>, M V N Ambika Prasad<sup>2</sup>, B M Satish<sup>1</sup> and S C Sharma<sup>3</sup><sup>1</sup>APS College of Engineering, Karnataka, India<sup>2</sup>Gulbarga University, Karnataka, India<sup>3</sup>Jain University, Karnataka, India

The nano sized PANI/CO<sub>3</sub>O<sub>4</sub> composites were synthesized using in situ deposition technique by placing fine graded CO<sub>3</sub>O<sub>4</sub> in polymerization mixture of aniline. This is the single step polymerization process for the direct synthesis of emeraldine salt phase of polymer. Low frequency dielectric studies were carried out on pressed pellets of PANI/ CO<sub>3</sub>O<sub>4</sub> with various concentrations of cobalt oxide (10, 20, 30, 40, and 50 wt% of CO<sub>3</sub>O<sub>4</sub> in PANI). The ac conductivity and dielectric properties are studied in the frequency range from 102 to 106 Hz. The results are interpreted in terms of polarons and bipolarons, which are responsible for the dielectric relaxation mechanism and frequency dependence of conductivity. It is found that a.c.measurements at room temperature may well serve as a parallel way to the time consuming d.c. conductivity versus temperature technique, to detect the thermal degradation of the transport properties in conducting polymers. It is observed that the charge motion via creation/annihilation of polarons and bipolarons increases as the weight percentage of the composite is increased. The results obtained for these composites are of scientific and technological interest.

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