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Emerging Materials Congress 2019: Dielectric relaxation and ac conductivity of nano sized polyaniline-cobalt oxide composites- Narsimha Parvatikar-APS College of Engineering

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The nano sized PANI/CO_3O_4 composites were synthesized using in place deposition technique by placing fine graded CO_3O_4 in polymerization mixture of aniline. this is often the only step polymerization process for the direct synthesis of emeraldine salt phase of polymer. Low frequency dielectric studies were administered on pressed pellets of PANI/ CO_3O_4 with various concentrations of cobalt oxide (10, 20, 30, 40, and 50 wt% of CO_3O_4 in PANI). The ac conductivity and dielectric properties are studied within the frequency range from 102 to 106 Hz. The results are interpreted in terms of polarons and bipolarons, which are liable for the dielectric relaxation mechanism and frequency dependence of conductivity. it's found that a.c.measurements at temperature could function a parallel thanks to the time consuming d.c. conductivity versus temperature technique, to detect the thermal degradation of the transport properties in conducting polymers. it's observed that the charge motion via creation/annihilation of polarons and bipolarons increases because the weight percentage of the composite is increased. The results obtained for these composites are of scientific and technological interest.

The discovery of intrinsically conducting polymers like polyacetylene, polyaniline, polypyrrole, polythiophene, polyindole, etc. have emerged as a active materials cause a good range of applications. The useful properties of those polymers are tunable by adding inorganic nanoparticles to them. for instance , increase of conductivity, dielectric constant and dielectric loss with increase of V_2O_5 was recorded in polyaniline-V_2O_5 composites. an honest thermal stability and noticeable crystallinity were observed in polyaniline-silver nanocomposites. Increased conductivity with metal nanoparticles has been measured for polythiophene-nickel and polypyrrole-copper nanocomposites. Increase of magnetization and reduce of conductivity were noted for polyaniline-Iron nanocomposites. The optical band gap decreased and electrical conductivity increased in polyaniline when doped with Ag nps. These fundamental properties and their variations in several environments for polymer composites cause the applications of the sort gas sensors, supercapacitors, microwave and electromagnetic radiation absorbers, resistive switching devices etc. On our extensive literature survey, it's learned that polythiophene cobalt nanocomposites haven't been explored for dielectric and ac conductivity. within the present paper the results on morphology, dielectric properties and ac conductivity of polythiophene-cobalt (PTh-Co) nanocomposites are presented.

The nanocomposites with an organized structure usually provide a replacement functional hybrid, with synergistic properties over their single-component counterparts, which have attracted considerable attention for his or her potential applications. Polymer nanocomposites are an important class of polymers, which have wide applications during a number of different industrial sectors and thus organic/inorganic nanocomposite materials have been extensively studied within the previous couple of decades. Conducting polymer nanocomposites possess the advantages of both low dimensional systems (nanostructure filler) and organic conductors (conducting polymer).

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