

Executive Summary of Project Report
Topic Of Minor Research Project " *Synthesis, Characterization*
and *study of some conducting polymers : A novel class of materials*"
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UGC File No. : 47-693/08 (WRO) dated 6th March 2009

Summary

(1) In the beginning period of the project, survey of the proposed research work is carried out by visiting some research laboratory including Post Graduate physics department , Rashtra sant Tukadoji Maharaj Nagpur university Nagpur and Dept of Chemistry, Pune University Pune. also with the help of library of Chemical engineering Laxminarayan Institute of technology , Nagpur . The literature and various aspect regarding synthesis , characterization and properties of conducting polymers was collected. The information gathered was very useful for proposed work.

(2) After thorough survey of literature on conducting polymers, it was come to know that poly pyrole, poly thiophene and poly aniline are most profound conducting polymers on which plenty of work had been carried out. Out of these polymers polyaniline is easily available , ease of processing , properties can be easily altered by suitable doping as well as most stable to environment and therefore it is worthwhile to carry on research project on polyaniline and its composites.

(3) The conducting polymers and its co-polymers are successfully synthesized as proposed. **Polyaniline Sulphate , Poly o-toluidine Sulphate , Poly m-toluidine Sulphate** and **their co-polymers** namely, **polyaniline-co-o-toluidine Sulphate** and **polyaniline co-m-toluidine sulphate** are synthesized by chemical oxidation method.

(2) The synthesized polymers are characterized by Uv-visible spectra, FTIR spectral analysis and Scanning Electron Microscopic (SEM) Techniques. By these spectroscopic tools it is confirmed that the samples / materials prepared are well synthesized.

(3) The values room temperature dc electrical conductivity measured by four probe experiment for **Polyaniline sulphate** , **Polyaniline Sulphate** , **Poly o-toluidine Sulphate** , **Poly m-toluidine Sulphate**, **polyaniline-co-o-toluidine Sulphate** and **polyaniline-co-m-toluidine Sulphate** is measured. This confirms that polymers prepared are of conducting nature. It also reveals that conductivity can be enhanced by proper doping.

(4) The variation of dc electrical conductivity with temperature of synthesized polymers are also carried out. It shows that electrical conductivity decreases with increase in temperature and confirms semiconducting nature of the conducting polymers .

(5) X-ray diffraction analysis are carried out and from it various crystallographic parameters related to structural determination are obtained (JCPDS File). From the XRD data, it reveals that some conducting polymers are of **Orthorhombic** crystal structure and some are of polycrystalline in nature.

(6) Scanning Electron Microscopy (SEM) photograph of the synthesized conducting polymers are also obtained and surface morphology is verified.

(7) Dielectric behavior of these conducting polymers are studied. The variation of dielectric constant with temperature is also carried out and the results are in well agreement with the reported literature.

(8) An attempt is also made to study the thermal stability of the conducting polymers under project in hand with the **Thermo Gravimetric Analysis (TGA)** technique and **Differential Thermal Analysis (DTA)** technique. By these techniques thermal degradation of the synthesized polymers can be understood.

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