

## Elective Group I

### CONDUCTING POLYMERS

#### Unit- I

Introduction, need of conducting polymers, Classification of conducting polymer, Concept of doping, n-Type, p-Type, Electrochemistry of electronically conducting polymers-source of electronic conduction in polymers, polaron, bipolaron conduction mechanism Methods of synthesis of Conducting polymers, Properties of conducting polymers, Structure-property relationship, Types of conducting polymers, e.g. Polyaniline (PANI), Polypyrrole (PPy), Polythiophene (PTh), Discovery of polyacetylene

#### Unit- II

Synthesis of conducting polymer-Chemical synthesis, electrochemical synthesis, template synthesis, precursor synthesis, soluble polymers (Colloid and dispersion), advantage and disadvantage of various synthesis methods. General Methodology; Synthesis and processability of selected conducting polymers like – polyacetylene, polyaniline, polypyrrole, polythiophene and poly-para – phenylene

#### Unit-III

Analytical Techniques for Characterization of Conducting polymers IR, UV, Impedance spectroscopy, Fourier Transform Infra red spectroscopy, X-ray photoelectron spectroscopy, Scanning Electron microscopy (SEM), Transmission electron microscopy (TEM), Electrochemical quartz crystal micro balance (EQCM)

#### Unit- IV

Application – Rechargeable batteries, LED, Gas sensors, bio sensors, photovoltaic energy device, micro electronics, PCB fabrication, electro catalyst. Application proposed antistatic coating, electrochemical mechanical device, super capacitor, Telecommunication system, Electromagnetic screening material, Analytical sensor.

Recent trend in conducting polymer, functionalized conducting polymer (Second generation polymer), Super conductor (Inorganic, organic hybrid structure), Conducting polymer based on nano composite.

#### Text book

1. Electrochemical science and technology of polymers -1 & 2 ed., R.G Linford,., Elsevier applied sciences, London 1987 and 1989.

#### Reference Books:

1. Hand book of Conducting Polymers: Terje A. Skoyheim (Vol.1), Dekker (668.42)
2. Hand book of Polymer Synthesis (Part B) : Hans Kricheldorf, Dekker (668.9).
3. Sensors: Principles and Applications: Peter Hauptmann, Prentice Hall
4. Polymer Science and Technology: Premamoy Ghosh, Tata McGraw Hill (668.42).
5. Hand book of organic conductive molecules and polymers, Hari Singh Nalwa (ed.), 4-volume set, John Willy and sons, England 1997.
6. Conductive polymers, T.Asaka, S.Kombe and T.Momma,.