

SYNTHESIS OF SOLUBLE POLYANILINES AND THEIR TECHNOLOGICAL APPLICATIONS

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Electronically conducting polymers belong to the special class of polymers possessing a long-range conjugation in their structures. Their electronic conductivities can be changed reversibly, in a range exceeding 20 orders of magnitude, and hence the same material can be made to have insulating, semiconducting, and fully conducting properties with concomitant change of their physico-chemical properties. Hence these materials have various technological applications.

Electronically conducting polymers can be prepared by chemical and electrochemical polymerisation routes. During their synthesis, these materials generally precipitate, and are highly insoluble in common solvents. Technological applications of these materials are, therefore, hampered by their intractability. Hence the development of processing techniques for these materials is very important.

During last ten years of research activities, we have designed and developed several novel techniques for processing electronically conducting polymers. We have discovered that although polyaniline is insoluble in common solvents, by substituting a methyl- or methoxy group to *ortho* position of aniline, substituted polyanilines can be prepared. These materials also possess electronic conductivity and their reduced forms are soluble in chloroform. Hence these polymers can be processed by solution casting. Methods were also developed to prepare conducting polymer-coated glass and plastic substrates, and conducting polymer grafted substrates. Conducting polymer intercalated layered materials were also prepared and characterised. In particular, polyaniline and polypyrrole intercalated clays (bentonite, montmorillonite, fuller's earth) were prepared and characterised. Applications of these advanced materials in liquid crystal display technology, and in gas sensing, were documented. In this communication, we reveal the progress we made in developing processing techniques for electronically conducting polymers and, technological applications of these highly valuable materials.

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