

1.1 Synthetic Control of Chemical Composition, Structure and Morphology of the Doped and Non-Doped Polymers

Scope

This research area is concerned with finding the effect of the following factors on the electronic, magnetic, mechanical, thermal and environmental stability characteristics of the doped (conducting) and non-doped forms of the title polymers and their derivatives:

- . chemical purity of the polymer
- . structural homogeneity (e.g. cis-or trans-isomeric forms, etc.)
- . molecular weight
- . conjugation length
- . relative amounts of crystalline and amorphous regions
- . morphology
- . macroscopic alignment of polymer chains
- . type and number of defect sites
- . replacement of H atoms by other groups
- . conduction mechanism (it is highly likely that several different conduction mechanisms will be operative depending on the degree of doping and hence the conductivity of the polymer).

Justification

Many detailed investigations on conducting polymers to date have been carried out on materials which have not been characterized as to chemical and/or structural purity by elemental chemical analysis, etc. This has sometimes resulted in the reporting of different properties for the allegedly same material. The studies outlined will put the field on a sound, reliable, experimental basis.

Status

By far the greatest number of studies have been carried out on polyacetylene, followed by poly(p-phenylene). Only very few studies have been performed on derivatives of these polymers and on poly(phenylenevinylene) and polyaniline. The fact that much is already known about $(CH)_x$ makes it a