- morphology
- environmental stability
- ability to mechanically align the polymer
- processability of the polymer
- type and number of defect sites

Justification

(i) Essentially all p- and n-doping of conducting polymers to date has been accomplished by chemical and/or electrochemical oxidation or reduction of the polymer pi system. There have been a few scattered and preliminary reports of the doping of $(CH)_x$, polypyrrole and polyaniline to the metallic regime by non-oxidizing protonic acids. These are presumably acid-base reactions, in which no formal oxidation of the polymer occurs. This unusual type of doping is not even qualitatively understood. Very extensive work needs to be done to ascertain the generality of this type of doping and why it leads to an increase in conductivity.

(ii) Until very recently essentially no studies had been performed on the effect of different dopant ions on the properties of the doped polymer. Changing the dopant ion presents a method of modifying the doped polymer which complements and supplements modifications incurred by replacing H atoms on the polymer with substituent groups as described in Section 1.1.

Status

(i) Preliminary studies have very recently shown that the doping of a form of polyaniline to the metallic regime by dilute aqueous HCl involves no oxidation of the polymer. Very little information is available concerning this novel form of doping as found in derivatives or other forms of polyaniline or other pi containing conducting polymers.