1.0 INTRODUCTION

Structural irregularities in presently available conducting polymers provide major limitations regarding both (1) obtainable properties and (2) understanding of structure-property relationships. These irregularities range on the molecular scale from chemical defects, chain ends, chain kinks, and chain folds to polycrystallinity and dopant nonuniformity. These defects are believed to limit conductivities and conductivity anisotropies, as well as to reduce the prospects for exciting transitions - such as metal-to-superconductor. Similarly, property degradation due to imperfections decreases the likelihood for applications as active components in electronic devices.

Finally, the fundamental physics of transport in conducting polymers in largely obscured by the high imperfect nature of available materials. For these reasons the proposed research deals with (1) development of improved understanding of the molecular, crystallographic, and defect structures of presently-available polymers; (2) using this information to evaluate the effect of structure on properties; and (3) development of synthesis and materials modification methods which improve structural and chemical perfection.

1.1 STRUCTURAL CHARACTERIZATION OF HIGHLY DISORDERED CONDUCTING POLYMERS

Scope

Characterize polymer molecular structure (both before and after doping) regarding chemical nature and regularity, chain geometry,