Status

A significant number of traditional and new analytical techniques have been developed by different portions of the materials science community. These techniques include x-ray diffraction, synchrotron diffraction, low angle x-ray scattering, diffuse x-ray scattering, neutron diffraction and scattering, electron, and ion spectroscopies, scanning electron microscopy (SEM), transmission electron microscopy (TEM) and other sophisticated chemical and analytical tools. The array of analytical techniques have not been applied consistently to this broad range of materials.

Research Proposed

The available analytical techniques as well as new techniques specific to the problems of conductive materials need to be brought to bear in this area. The advent of the use of cyclic voltammetry in the conducting polymer field is an example of greatly increased understanding which results from the overlapping of this conductive materials science and measurement science. Examples of the more traditional techniques that need to be more consistently applied include fourier transform infrared spectroscopies, mass spectrommetry using modern sampling techniques, synchrotron radiation and x-ray diffraction as well as sophisticated magnetic resonance measurements. Because of the broad materials questions that arise, the ability to handle the large amount of data generated is an important limiting factor. Hence, software and hardware for computer manipulation of the data is an important consideration. Sufficient funding is necessary to enable the colloborative mode of interaction that is a part of application of these techniques to these new novel materials.

1.3 Physical Properties

Scope

How do we go from a chemical or physical understanding of model compounds to an understanding of the real materials to be used in applications?

Justification

The transfer of novel materials to engineering groups and the realization of applications requires an understanding of the relationship of the macroscopic properties to the chemical and physical properties of the model systems usually studied.