Beside phthalocyanine as the macrocycle in Fig. 1, tetrabenzoporphyrine, naphthalocyanine and other planar thermally stable systems must be investigated. The band structure can be altered by electron donating and electron accepting groups in the macrocycle. The synthesis of these substituted macrocycles should be worked out. New bridging ligands (which are also responsible for a band structure) should be studied, e.g. SCN^-, N_3^-, etc.

Advantages of These Systems

(1) Conductivity without external doping is expected (and has been proven in various examples).

(2) The synthesis of polymers is easy and not expensive.

(3) The polymers are thermally stable.

(4) Composites with other polymers are possible.

MODIFICATION OF CONVENTIONAL POLYMERS

Scope

In the past 10 - 20 years numerous efforts have been focussed on preparation and characterization of novel conductive polymers. However, commercially available polymers or readily synthesizable polymers may be modified to coductive materials.

Surface Treatments

Carefully controlled oxidation, reduction, or elimination of certain groups (cf HCl, HF and H_2O) may produce semi- and conductive materials.

(1) Elimination of hydrogen halides from polyvinyl halide and copolymers of vinyl halide and olefinic monomers.

(2) Elimination of halogen from polyhalogenated olefinic polymers.

(3) Radiation effects on polyolefinic polymers.

(4) Metal ion implantation on polymers.

Research Proposal

The above areas need to be reinvestigated on better controlled materials without destruction of their physical form or physical properties. In addition a new area to be investigated is the synthesis of composite systems.

(1) Formation of polypyrrole, polythiophene, etc. on conventional polymers to combine desirable physical properties.

(2) Stabilization of conductive polymers by treating (coating, blending, bonding) with polymers.