

CHAPTER II

LITERATURE SURVEY

Numerous researches have reported the preparation and characterization of formation of conducting PPy applied to improve their properties and processibility briefly described below.

Funkhouser *et al.* (1995) studied the solubilization and adsolubilization of pyrrole by anionic surfactant, sodium dodecyl sulfate (SDS). The solubilization of pyrrole was measured by the semiequilibrium dialysis. It was found that the highest solubilization constant, K , was 2.85 M^{-1} in the absence of salt, NaCl, and the minimum K was 1.95 M^{-1} at 0.1 M salt. They showed that the effect of pyrrole (0-0.16 M) cause a decrease in surfactant adsorption. In the addition of salt (0-1.5 M) improved pyrrole adsolubilization. The result of resistance showed that no film formed on the alumina using the solution of SDS. The much thicker film was obtained in the solution of PPy without salt and surfactant.

Genetti *et al.* (1998) prepared nickel-filled low-density polyethylene composites involving coating the nickel with PPy by admicellar polymerization.

The particle-particle contact and the tunnelling resistance of this material were reduced because of the PPy “molecular wires” formed chain entanglements at high filler loading. The product coating the nickel particles with PPy was obtained with increasing in conductivity. The thermal and the mechanical properties were not changed.

Saoudi *et al.* (1997) reported the adsorption of DNA (Deoxyribonucleic acid) onto conducting polypyrrole powders by the depletion method in combination with UV spectroscopy. They focused on

adsorption was obtained to be in the range of 0.13-0.55 mgm^{-2} . At low pH and high ionic strength allowed strong DNA adsorption. The adsorption isotherm was found in the Langmuir type or sigmoid. The results were explained in terms of electrostatic interactions between the negatively charged DNA and the positively charged PPy surfaces.

Cooper *et al.* (1989) prepared the conducting films by casting aqueous dispersion of mixed polymer latices on supporting glass microscope slides; one of latices is conducting (polypyrrole and polyaniline) and the other film-forming (a copolymer of polymethylacrylate and polybutylacrylate). The polypyrrole formed roughly spherical in shape showed a highly increase in percolation threshold at a weight fraction of 20%. While the polyaniline particles formed needle-shaped exhibited the lower percolation threshold at about 5%. They also prepared composite beads (50-100 μM) having a non-conducting polymer (polymethacrylate) and a conducting shell (polypyrrole).

Yassar *et al.* (1987) investigated the chemical polymerization of pyrrole onto latex particles in aqueous solution. The monodisperse polystyrene latex particles were derivatized with sulphonic or carboxylic groups. The FeCl_3 and H_2SO_4 were used as oxidant for this polymerization. The conductivity was measured on pressed pellets of the latex particles after washing with water and evaporating the solution. The morphology of these latex particles was observed by scanning electron microscopy. They concluded that latex particles in aqueous solution can be coated with a conducting polypyrrole film. The film thickness can be controlled, hence the conductivity of the particles obtained at high value (0.25 S cm^{-1}).

Radharishnan and Saini (1994) studied the conducting thermoplastic elastomer blends prepared by deposition of PPy in styrene-butadiene-styrene (SBS) block copolymers with varying ferric chloride (FeCl_3). The structure of these polymers was measured by optical microscopy, X-ray diffraction and

infrared spectroscopy. It found that phase segregated SBS-PPy blends were occurred by preferential deposition of polypyrrole domains separated in matrix. The effect of deformation on resistivity of these composites was investigated in extension and compression modes. The electrical resistivity (ρ) for these blends showed a transition of 273 K and was sensitive to small mechanical deformation of two modes.

The conductive polymer composites of poly (methyl methacrylate) and polypyrrole (PMMA/PPy) were prepared by a chemically oxidative modification method. Omastova *et al.* (1998) reported that these composites occurred as a network-like structure of polypyrrole embedded in an insulating polymer matrix. The electrical conductivity of composites was obtained from a mixture of coated and non-coated PMMA particles. The PMMA/PPy composites were characterized by X-ray photoelectron spectroscopy (X.p.s). The results obtained from this analyzer indicated that pyrrole was polymerized inside the PMMA particles.

The preparation, characterization, and adhesion of monodispersed polypyrrole particles in range from 17 to 59 nm in diameter were synthesized by the oxidation of polypyrrole with sodium persulfate in the nonionic Rhodasurf TB970 polymeric stabilizer and 4-ethylbenzenesulfonic acid. The adhesion of particles on glass beads was studied with the effect of pH by a packed column technique. The authors, Zelenev *et al.*(1998), described that the deposition of PPy on glass at pH values below its isoelectric point (i.e.p) was found to form a monolayer particles.

Lascelles *et al.*(1998) studied the effect of varying the oxidant, monomer, and silica sol concentrations, silica sol diameter, polymerization temperature, stirring rate and oxidant type, on the particle size, polypyrrole-silica nanocomposite particles. The results show that these particles were insensitive to almost all of these functions. They displayed that the colloid stability of these particles depended on the silica content. A silica-rich

nanocomposite was synthesized by using oxidant, $(\text{NH}_4)_2\text{S}_2\text{O}_8$, in the presence of electrolyte. While a PPy-rich nanocomposite prepared by using FeCl_3 exhibited lower colloidal stability than that of a silica-rich nanocomposite.