CHAPTER V
CONCLUSIONS

Polyaniline emeraldine base can be synthesized by chemical oxidative polymerization and $(NH_4)_2S_2O_8$ was used as an oxidant at monomer/oxidant ratio = 1:1. The conductive form of polyaniline (emeraldine salt) was obtained by acid doping processes. HCl, H_3PO_4, CH_3COOH and $C_5H_{11}COOH$ were used as acid dopants. Characterization of the doped-polyaniline films synthesized with various acid dopants and acid/polymer concentration ratios (N_a/N_p) revealed different physical properties. A higher acid concentration gave a higher specific conductivity because of the increase in the degree of protonation and bipolaron/polaron states were created as identified by UV-VIS and FT-IR techniques. For the HCl-doped polyaniline, the highest specific conductivity was obtained at N_a/N_p=9.8E+02 (C_a/C_p=10:1) consistent with the highest degree of crystallinity. The specific conductivity tended to decrease after N_a/N_p>9.8E+02 (C_a/C_p>10:1) because of the decrease in the electronic conjugation length and the lower degree of crystallinity as observed by XRD technique. For CH_3COOH and $C_5H_{11}COOH$-doped polyanilines, the specific conductivity increased gradually with N_a/N_p and attained the equilibrium values at N_{AcOH}/N_p=5.9E+03 and $N_{Hexanoic}/N_p$=3.1E+03 (C_a/C_p=1000:1), as the doping was completed. The specific conductivity of the doped-polyaniline films increased when exposed to water and ethanol because of the increase in the interchain and intrachain H^+ transfer and the charge mobility. The specific conductivity after the exposure to water was greater than that when the exposure to ethanol because of the differences in the molecular sizes and the corresponding diffusion coefficients between water and ethanol.