CHAPTER V
CONCLUSIONS

Recently, polymer-based gas sensors have received considerable interest due to their gas-sensing ability through electrical conductivity changes when exposed to gas. Poly(3-thiopheneacetic acid)(Pth) was chemically synthesized via an oxidation polymerization and doped with $HClO_4$. Doped Pth was investigated as a NH_3 gas-sensing material due to its positive electrical conductivity response. Because of the well-defined structure of zeolite, the electrical conductivity sensitivity can be further improved by introducing Y zeolite into the doped Pth matrix. The effects of zeolite content and Si/Al ratio on the electrical conductivity response of poly(3-thiopheneacetic acid)(Pth) and composites when exposed to NH_3 were investigated.

Doped Pth at 10:1 has the highest electrical conductivity. The electrical conductivity sensitivity of the composites towards NH_3 is improved with the addition of zeolite Y up to 10 %v/v. From 20 to 50 %v/v of zeolite Y, the electrical conductivity sensitivity decreases due to the diminishing of the active sites that available for the interaction between NH_3 and the polaron or the bipolaron species. The electrical conductivity sensitivity ($\Delta\sigma/\sigma_{N2}$) increases linearly with increasing Si/Al ratio. Because the number of Si in the zeolite Y structure facilitates the electrostatic interaction between oxygen on the Si molecule in the zeolite Y and NH_3. The interaction of NH_3 and doped Pth is reversible based on the FTIR spectra.

Recommendations

1) The effect of cation type and cation content in Pth/Zeolite composites on the electrical conductivity response towards ammonia.