CHAPTER VI
CONCLUSIONS

In the present study, poly(3-thiopheneacetic acid) was synthesized via oxidative polymerization by using ferric chloride as an oxidant and doped with perchloric acid. The composites using poly(3-thiophene acetic acid) as the matrix and mixed with three different zeolites were investigated for their interaction with H_2 towards sensor applications. Zeolite L, Mordenite and Beta were chosen in our study. The effects of zeolite type, zeolite concentration, cations type and cation concentration were investigated.

The negative electrical conductivity response and sensitivity are present due to the weaker interaction between H_2 and the polaron or the bipolaron species than that of N_2. For the effect of zeolite type, the composite with 20% v/v of BEA has the highest the electrical conductivity sensitivity due to the lowest amount of Al. The interaction between H_2 and the polaron or the bipolaron species also increased. The induction time increased with decreasing an amount of Al due to the greater available active sites of positive charges on the polymer chain. At 20% v/v, MOR was ion-exchanged from Na^+ into Li^+ and K^+ forms. The Li^+ form has a lower electrical conductivity sensitivity than those of the Na^+ and the K^+forms due to the higher electronegativity and a smaller ionic radius. To investigate cation concentration, Na^+ cations were load into Zeolite L: 0, 15, 20, 30 and 50 mole%. The electrical conductivity sensitivity increased with increasing Na^+ content until 30 mole%. The loading of Na^+ cations causes a more loosely binding interaction between the cation and H_2 and correspondingly a more favorable interaction between H_2 and the conductive polymer. Adding zeolite Mordenite at small contents causes increases in the electrical conductivity sensitivity. At high zeolite contents, the reduction of sensitivity value arises from the diminishing available active sites on the conductive polymer.