CHAPTER IV
CONCLUSIONS

The synthesis of the soluble polypyrrole can be achieved by using DBSA as a dopant and polypyrrole films can be prepared by suspending a drop of polypyrrole dissolved in m-cresol and applying it by hand. Characterization of the DBSA-doped polypyrrole films synthesized with a variety of DBSA concentrations and doping levels revealed different properties. A higher concentration of DBSA gives a higher conductivity for the polypyrrole film because DBSA removes electrons from polypyrrole chains and bipolarons are created which can be identified by using FTIR, EA and UV-VIS techniques. Moreover SEM images of the synthesized DBSA-doped polypyrrole show granular morphology and changes into fibrillar morphology at a higher doping level. Temperature dependence of the DBSA-doped polypyrrole films was studied because it is important for gas sensor application. We found that the specific conductivity of 0.20 M to 0.40 M DBSA-doped polypyrrole films shows a general feature of a conductive polymer; the conductivity increases with increasing temperature, whereas in the case of 0.14 M and 0.15 M DBSA-doped polypyrrole films, the opposite dependence occurs at low temperature in range of 20 ^{o}C - 32 ^{o}C. However, there is a limitation on the temperature range in the experiment; if temperature range can be expanded, we would have obtained more information on the temperature dependence of DBSA-doped polypyrrole films. The specific conductivity of DBSA-doped polypyrrole films was also studied at various SO_2 concentrations. We found that they show increase in the specific conductivity with SO_2 concentration therefore we can conclude that the DBSA-doped polypyrrole films can be used as a SO_2 sensor for the SO_2 concentration range of 500 - 2500 ppm. In SO_2 atmosphere, the conductivity of polypyrrole films increases with temperature but at high

temperature range it decreases. The 0.15 M DBSA-doped polypyrrole films seem to show the highest sensitivity as the SO_2 sensor because of the largest conductivity change when exposed to SO_2 atmosphere.