CHAPTER V
CONCLUSIONS

Polyaniline was synthesized by oxidative polymerization by using ammonium peroxydisulfate as an oxidant. Polyimide was synthesized by amidation reaction followed with the cyclodehydration reaction. The synthesized polyaniline and polyimide were extensively characterized by EA, FT-IR, EDX, UV-Vis., TGA, SEM and PA.

PANI-CSA possessed a significantly higher specific conductivity than PANI-HNO_3 at % doping level lower than 30 due to its lower value of the acid dissociation constant. The specific conductivity of PANI-CSA and PANI-HNO_3 were comparable and attained the plateau at the % doping level higher than 30. The specific conductivity values of 100 % doping level for PANI-CSA and PANI-HNO_3 were 5.61 and 2.38 S/cm, respectively. The specific conductivity decreased with increasing amount of polyimide. The percolation threshold for both PANI-CSA/30% PI and PANI-HNO_3/30% PI was about 45 %wt of doped polyaniline at the value of specific conductivity of 0.32 and 0.26 S/cm, respectively.

The electrical conductivity upon exposed to CO followed an power law equation $\Delta\sigma = a[CO]^b$ where the value of 'b' characterizes the concentration dependence. The sensing property of the pure system was a function of the number of charge carrier and the amount of crystallinity. The PANI-HNO_3 possessed a higher value of concentration dependence than the PANI-CSA (b = 0.55 and 0.30) due to its higher number of attack sites and difference in morphology. The electrical conductivity decreased with increasing temperature. For the PANI-HNO_3/30% PI (b = 0.46),it possessed a lower value of concentration dependence than PANI-CSA/30% PI (b = 0.70) at room temperature due to the electronic charge barrier effect from PI. At a higher temperature, the values of concentration dependence were not significantly different between PANI-HNO_3/30% PI and PANI-CSA/30% PI due to the compromise between the effect of kinetic energy of gas and of electronic charge.

HNO_3 doped polyaniline at doping ratio of 10 blended with 30 %wt polyimide is suggested to be used at elevated temperatures as a CO sensor.