CHAPTER FIVE

CONCLUSION

5.1 Conclusion

The main focus in the current study is the electrical resistance behavior of nanocomposite films of MWCNT/PEO, MWCNT/PVA and MWCNT/PVA/ZnO to be employed as gas sensor applications. We have demonstrated the feasibility of using MWCNT-polymer and MWCNT-polymer-metal oxide which was produced by solution casting method as sensitivity sensors for the detection of methanol vapor at room temperature.

It was observed that mechanical milling of ZnO powder produces homogenous sized nanoparticles with grain size equivalent to 12nm, 13nm and 11nm at 10 hours, 20 hours and 30 hours milling time, respectively. This indicates that 10 hours is the limit for producing nanosized ZnO particles using our system. The FTIR measurements showed that peaks of MWCNT/PVA were presented C=C stretching band at 1740-1725cm^{-1} and peaks of MWCNT/PVA/ZnO were presented Zn-O stretching band at 829-822cm^{-1}. This indicate that frequency and vibration between binding atoms increased when the amount of MWCNT and ZnO increase.

The sensing properties of the various composites were measured as a function of methanol vapor composition of 1.7, 3.3, 5, 8.3 and16.7vol% with different time, the results showed that methanol flow rate is fixed with different concentration, the increasing of concentration does not affect the sensitivity of the composites. In all the composite systems, the highest sensitivity was recorded at moderate methanol concentration in water of about 5%. At higher concentrations, saturation of interaction between methanol molecules with π-electrons in the carbon nanotubes resulted in much reduced sensitivity.

For MWCNT/PVA composites, highest sensitivity was recorded at almost 250% for samples containing 5% MWCNT. However, such result was also recorded using MWCNT/PVA/ZnO at 1% MWCNT and 3% ZnO. It is obvious that ZnO improved the sensitivity by contribution in the sensing mechanism.

5.2 Suggestions for Future Work

We can prepare same composites but with higher concentration of MWCNT and ZnO. Moreover, we can expose the composites to higher temperature to study their various properties with alcohol sensor. Although results of CNT show that CNT has great potential for the creation of conductive sensors that can be used in future smart applications.