CHAPTER 8
CONCLUSIONS AND SCOPE FOR FUTURE WORK

8.1 CONCLUSIONS

Various samples of conductive polymer composite were prepared and studied by taking different compositions and were characterized by different experimental techniques such as AC conductivity X-ray diffraction technique, scanning electron microscopy, thermo gravimetric analysis, ionic conductivity, tensile test etc and following are the important findings and conclusions of the present work

- The development of a new polymer electrolyte with good ionic conductivity.
- Better understanding of the doping of different nanomaterials in polymer electrolytes.
- Development of ion conducting polymer electrolyte film which can be used for electronic and photovoltaic device

- The polymer composite specimens PVP+30%KI, PVP+40%NaI, PVP+40%KOH and PVP+30% NH₄I are having highest value of conductivity among its group having same type of salt and varying from 10 to 40% of weight of PVP.

- The nanocomposites specimens PVP+30%KI+4%Al₂O₃, PVP+30%KI+4%AlN, PVP+40%NaI+12%ZnO, PVP+40%NaI+8% BaTiO₃, PVP+40%KOH+8%NiO and PVP+30% NH₄I+12%NiO are having highest value of conductivity among its group having same kind of material composition but nano materials varying 4 to 16%.

- The nanocomposites based on the conductivity are arranged in order from highest to lowest as PVP+30%KI+4%Al₂O₃, PVP+30%KI+4%AlN, PVP+30%NH₄I+12%NiO, PVP+40% NaI+12%ZnO, PVP+40% NaI+8% BaTiO₃ and PVP+40%KOH+8%NiO.
• The Ionic Transference number test reveals that ions are having major contribution in conduction process of polymer electrolyte and nanocomposites.

• The tensile tests are carried out on the nanocomposites. The nanocomposites based on the tensile strength are arranged in order from highest to lowest as PVP+30\% KI+16\% AlN, PVP+30\% KI+16\% Al_2O_3, PVP+40\% KOH+16\% NiO, PVP+30\% NH_4I+16\% NiO, PVP+40\% NaI+16\% BaTiO_3 and PVP+40\% NaI+16\% ZnO.

• The microhardness test are carried out on the nanocomposites. The nanocomposites based on the hardness number are arranged in order from highest to lowest as PVP+30\% KI+4\% AlN, PVP+30\% KI+16\% Al_2O_3, PVP+40\% KOH+16\% NiO, PVP+30\% NH_4I+16\% NiO, PVP+40\% NaI+16\% BaTiO_3 and PVP+40\% NaI+16\% ZnO.

• Swelling and Solubility studies reveals good stability of nanocomposites in water and moisture.

• Thermal studies revealed the stability and glass transition temperature of nanocomposite.

• XRD patterns of Polymer Nanocomposites have been studied. The change in intensities of peaks revealed the information about the structure of polymer nano composites.

• SEM studies revealed the size of nano material and also distribution of dopants in host polymer. SEM is used to investigate the morphology of the samples. By analyzing the SEM images, Distribution of salt in samples were verified, the higher porosity revealed the improved ionic migration in the sample.

• FTIR spectroscopy revealed about the quality and consistency of the polymer nano composites.

• The photovoltaic cell based on the developed nanocomposite is designed and fabricated.
8.2 SCOPE FOR FUTURE WORK

Hybrid Nano material can be used for research of nanocomposites.

Polymer blends can be used to obtain the new polymer electrolytes.

More efficient method of stirring the solution for solution cast method can be tried.

Design and fabrication of new stirrer can be considered.