CHAPTER 5

CONCLUSION AND SUGGESTIONS FOR FURTHER WORK DISCUSSION

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Conclusion

Semiconductors have electrical conductivities in between that of conductors and insulators. In this work, two sulphide based semiconductors i.e. PbS and SnS have been prepared and their identification confirmed by XRD analysis.

The observed X-ray diffractogram reveals that the samples prepared are PbS and SnS since the maximum intensity peak matches the JCPDS data. Not only do the 2θ values agree but d spacing and intensities values agree too.

The composition and stoichiometricity of the samples were confirmed by EDAX analysis. EDAX spectrum showed that the samples prepared are PbS and SnS since the percentage of Pb to S and Sn to S is approximately 1:1 within limits of the equipment's accuracy.

The SEM micrograph shows that PbS particles are needle like whereas those of SnS are worm like or fibrils like structure. Impedance

Cyclic voltammetry in this work shows that PbS and SnS can undergo redox reaction and thus enabling the insertion and deinsertion of lithium ion. Many redox loops are observed in the plotted cylic voltammograms. Upon observing the cyclic voltammograms it is observed that the current does not change on changing scan rate indicating that the reaction is not that of diffusion but rather electron transfer control reaction. This is expected since the conductivity of PbS and SnS is small and therefore the slowest step in the mechanism is the electron transfer step. X-ray analysis results show that the mechanism of insertion and deinsertion of lithium ion takes place via the formation of compound/s e.g.LiSn, LiSnS, LiPb and LiPbS. This work also has successfully shown that the samples can be used as anode in lithium ion cell. The fabricated cell indicate that it can be charged indicating that lithium ion can be transferred to the anode. However work need to be carried out to improve the battery performance.

As a suggestion for further work it may be useful to run the cyclic voltammetry experiments for many cycles followed by XRD experiments to investigate the reaction mechanism and stability of the material.