SUMMARY AND CONCLUSION

CHAPTER 5

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The technical interest in the study of the properties of thin films has resulted in the invention of many novel devices. Polymer materials have been widely used in various fields such as industrial products, polymer optical fibers, optical waveguides and optical connectors due to their ease of processing, relatively low cost and mass production compared to silica based optical materials.

In the present research work polystyrene and poly(methyl methacrylate) have been selected because of their flexibility and superior mechanical properties, ease of fabrication as thin films and its ability to form good contact with electronic and optical materials. Thin films of PS, PMMA and PS/PMMA composite have been coated on glass substrates using Chemical Bath Deposition and Spin coating method. PS, PMMA and composite films were characterized using various characterization techniques. Thickness of PMMA films prepared by CBD method lies in the range of 4.4μm to 5.3 μm and thickness of PS films prepared by the same method lies in the range of 4.3μm to 5 μm. Thin films of PMMA, PS deposited by Spin coating have thickness around 3 μm and 5.5 μm respectively.

It has been attempted to understand the structural and optical properties of PS, PMMA and PS/PMMA composite thin film samples. The optical properties of the coated films were analysed using UV-Visible and photoluminescence spectroscopic methods. All the samples have maximum transmittance peak around 300 nm. PMMA film shows transmittance above 90% whereas the composite film exhibits 90% transmittance and also has consistent transmittance over the IR region. This feature of the film will be very much favorable for IR therapy. The bandgap of PS and composite films were calculated as 70 nm, 50 nm respectively, which indicates that PS/PMMA composite can be a perspective candidate for UV pass filters and also the addition of PMMA has tailored the band structure of PS. PMMA and PS are well known amorphous materials. The XRD pattern indicates the amorphous nature of the film. Surface structure of the composite

film was analysed by SEM, which indicates the homogeneous, continuous and crack free surface. Rods like grains were also found from the SEM image.

This acquired knowledge can be extended for the further optimization of the polymer thin films. In order to have further understanding of polymer films, electrical and structural measurements can also be explored.