CHAPTER 8

CONCLUSION

Good optical quality single crystals of organic thiourea and semiorganic CTN, NTC, ZTC, ZTS, PTC and PTS crystals were grown by solvent evaporation technique at room temperature. The grown crystals possess well defined morphology and sizes of the crystal are also calculated. Unit cell parameters have been evaluated by XRD technique. XRD analysis confirmed that the crystals exhibit orthorhombic structure. The various functional groups present in the crystals are analyzed by FTIR Spectrum. FTIR analysis confirmed thiourea could form metal complexes by coordinate bonds through sulphur and nitrogen. The good transparency natures of the crystals in the entire visible and near infrared regions have lower cutoff wave lengths of around 220 nm – 236 nm. They have good expected characteristics for NLO materials, which confirm its suitability for optical device fabrication. The band gap energies for the grown crystals are calculated, which are around 5.2 eV -5.6 eV. The mechanical properties were carried out to understand the hardness parameters, yield strength and stiffness constant for the grown crystals. A graph has been plotted between Vickers hardness number (HV) and applied load (P). The result confirms the non-liner behavior of the microhardness of the crystals may be due to cleavage plane of the samples. The microhardness study shows that hardness steadily increases for lower loads and then decreases for higher loads. The work hardening index showed that the crystals in the present study are moderately softer substance. Yield strength has been estimated from microhardness measurement upto a load of 200g using Vickers microhardness tester. The value of stiffness constant indicates that the binding forces between the ions are quite strong.
Scope for the future work

Findings obtained from this research work will open a new avenue for the growth of high transmittance and mechanically soft and hard crystals. This work may be continued to grow the same crystals doping with urea and amino acids and their properties may be assessed to manufacture competent nonlinear optical devices.