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Solid State Research Laboratory:

The rapid development as well as the enormous applications in the field of applied physics and materials science has felt the need of highly sophisticated research laboratory in the Department of Physics. The aim is to impart education and research at various levels. Presently the Department has various facilities in the field of experimental solid state physics and materials research which include; high temperature microprocessor controlled furnaces (1350, 1400 °C), High frequency impedance analyzer, single crystal growth unit, Polarization measurement setup etc.

The Solid State Research group is actively engaged in the growth/preparation and characterization of single crystals, polycrystalline materials and ceramics of some dielectric, magnetic and multiferroic materials for basic research. The emphasis is laid on the studies of coordination compounds containing rare-earth elements having important physical properties such as ferroelectricity and non-linear optical behaviour (second-harmonic generation), ferroelectric materials based on perovskite structure, magnetic hexaferrites based on pure and rare-earth doped phases, composite multiferroic materials based on titanates and hexaferrite phases.

We are also interested in growing bi-layer thin films with enhanced magnetoelectric properties mostly influenced by structural strains. Preparation of single phase multi-ferroics are considered to be a challenging task. Moreover, the co-existence of ferromagnetism/ferrimagnetism and ferroelectricity in single phase materials is quite rare and very difficult thus driving the development of composite multiferroic materials. By preparing a new class of ferrite-ferroelectric composites with improved properties we can contribute to the existing knowledge of these category of materials. The laboratory prepared ferrite-ferroelectric composites will serve as a multifunctional materials: Besides being composite materials, they can serve as ferrites and ferroelectric materials on individual level (both of which have important applications). The Solid State Research Laboratory will go a long way in providing experimental facilities to the scholars who are interested in working in the field of experimental solid state physics.

1. High Temperature furnace:

The HT furnace in the SSR Lab. can be used to prepare ceramic materials such as ferroelectric and magnetic oxides. A maximum sintering temperature of 1400 oC can be achieved with the available facility.



Fig.1 High temperature tube furnace with controlled Ar and N₂ gas purging.

High frequency Impedance Analyzer: Model Waykerr 6440B (20Hz to 3 MHz)



VSM Laboratory :

The Department of physics also has a state of art 2.7 Tesla Vibrating Sample Magnetometer (VSM) Model MicroSense (USA) which is capable of working in the temperature range of -195°C to

700 °C. The availability of this advanced research equipment has made the Department indigenous in the field of experimental characterization of magnetic materials both bulk as well as at nanoscale.



Fig.1 MicroSense (USA) 2.7 Tesla VSM