Manganites with perovskite structure are the class of compounds referred as the rare earth manganites that is characterized by extremely interesting structural and physical properties and phenomena, including Colossal Magnetoresistance (CMR) [1].

The structure of the $RE_{1-x}M_xMnO$ (RE= rare earth) oxides is close to that of the cubic type perovskite (CaTiO3), but the structure of manganites generally corresponds to a lower rhombohedral symmetry (LiNbO3) or orthorhombic (GdFeO3) structure [2] such as LaSrMnO3, S.G. Pnma.

We present preliminary studies and results of the $RESrMnO_3$ system where substitutions RE=Dy,Yb for La in perovskite type structure were carried out. Samples were prepared by the solid-state reaction method in air at ambient pressure. Process of synthesis was followed by thermal analysis (TGA and DTA) and X-ray powder diffraction (XRD). Morphology of resultant samples have been observed by Scanning Electron Microscopy (SEM) and the stoichiometry has been analyzed by Electron Dispersive X-Ray Spectroscopy (EDX).

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Crystallization in lipidic cubic phase. The impact of additives on phase behaviour

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To solve the structure of a membrane protein to atomic resolution is still a challenging task. Apart from conventional crystallization techniques the use of lipidic cubic phase (LCP) is of growing interest and was successfully applied to crystallize a number of G protein coupled receptors [1-4]. The LCP three-dimensional networks consist of a continuous bilayer defined by two distinct water channels, referred to as bicontinuous networks. Most commonly monoolein (MO) is used, forming cubic phases at temperatures suitable for crystallization.

A versatile tool to study this phase behaviour is x-ray diffraction analyzing the data in the small angle regime. Fitting scattering models to the experimental data allows to identify structural changes in the aqueous and the lipid bilayer subcompartments.

To make use of the cubic phase and to facilitate the crystallization of membrane proteins, detergents, precipitants and other additives need to be added. These chemicals tend to destabilize the network structure. Therefore it is crucial to understand their impact on the phase behaviour.

These effects are studied by addition of detergents and precipitants, known to facilitate the crystallization of membrane proteins, according to a ranking from the Membrane Protein Data Bank. In preceding experiments, depending on the type of detergent or additive and the concentration clear differences in the phase boundaries could be detected.

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Crystal growth and characterization of 4-(dimethylamino) benzaldehyde doped TGS Crystals

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Single crystals of 4-(dimethylamino) benzaldehyde doped ferroelectric Tri Glycine Sulphate (DBTGS) were grown by slow evaporation from its aqueous solution at ambient temperature, using solution growth method. Solution grown DBTGS crystals were characterized by dielectric and pyroelectric measurements. The capacitance of DBTGS was measured using HP 4194A impedance/ gain phase analyzer at 10 kHz at a cooling rate of 1°C/min using Metler hot stage FP90 and the pyroelectric current was measured using Keithley 610C electrometer over the temperature range of 30 to 60°C in the ferroelectric direction. The direct method of Byer and Roundy was used for the measurement of pyroelectric current. The sample preparation and the measurement technique used in the measurement of capacitance are discussed in detail. Pure TGS crystals exhibits ferroelectric phase transition at 48.5°C with ε'_{peak} 8800 . However for doped DBTGS crystals phase transitions is observed at 51°C with decreased ε'_{peak} (1930). Higher Pyroelectric coefficient was observed for the doped DBTGS crystal. The doped crystal was irradiated with graded dosages from 5 kGy to 80 kGy electron beam from 8MeV Microtron (Energy-8MeV, pulse current-50mA (max), pulse duration-2.5μsec, pulse repetition rate-250 Hz (max)) at room temperature and radiation effects on the dielectric and pyroelectric properties of the crystals were investigated. The dielectric study shows that there is a gradual reduction in dielectric constant at T_C and shifting of Curie temperature towards lower temperature region with increase in electron radiation dose. The material figure of merit (Fv) was found to be higher for the irradiated crystals.

Keywords: crystal growth, TGS crystals, ferroelectric

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Generation of high quality crystal surfaces of small soft organic crystals

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In a time resolved micro-crystallography experiment the X-ray beam is focused to a size of a few microns. This allows probing a small crystal volume very close beneath the surface, where high populations of the excited state can be generated (visible pump light has penetration depths of a few microns only at the absorption maximum) [1]. Such experiments require well defined and low-roughness crystal surfaces. Traditional crystal polishing methods can not be applied for many