PECULIAR ASPECTS IN FERROELECTRIC TRANSITION OF TRIGLYCINE SULPHATE CRYSTAL

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Abstract. *Fundamental dielectric parameters of pure triglycine sulphate crystals were determined versus temperature (-120/+50* ^{o}C*) and frequency (*1 Hz-10 MHz*), in the ferroelectric phase, following a special temperature program. Essential ferroelectric parameters, relaxation time and Cole-Cole parameters were estimated on a large temperature range. It has been found three relaxation processes in the approximate frequency ranges: LOW (*~10^2 Hz*), MEDIUM (*~10^4 Hz*) and HIGH (*~$4\cdot10^5$ Hz*). The HIGH relaxation seems to be related to the fundamental effect of long range interaction specific to ferroelectric effect, while the LOW relaxation is related the ferroelectric domain interaction. The MIDDLE relaxation do not appears to have a specific physical support, being rather an interaction of the previous ones through the lattice dynamic.*

Keywords: triglycine sulphate, ferroelectric transition, dielectric relaxation vs. frequency and temperature, relaxation time, activation energies

1. Introduction.

Ferroelectric crystals and ceramics have important technological applications. Triglycine sulphate crystal (TGS) was intensively studied for its fundamental properties and important technological applications, particularly high sensitivity pyroelectric detectors [1, 4]. We have earlier presented single crystal growth conditions and important ferroelectric properties [5, 7]. Relaxation phenomena we have also extensively studied [8, 13].

In this paper we present original data obtained based on the concept of Cole-Cole representation [14] and the relaxation time for the three relaxation processes, we have found. Activation energies shall be estimated from Arrhenius representations and the nature of the relaxation processes shall be discussed.

2. Experimental.

Pure TGS crystals were grown from solutions prepared from purified substance, synthetized and purified by fractional recrystallization [8]. Crystals were grown in a thermostated oven, by slow solvent evaporation at 54 ^{o}C, in paraelectric phase. This way, it was avoided the lattice distortions which usually are involved in growth of crystals in ferro phase, due to defects and mechanical tensions

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