THERMAL BEHAVIOUR OF ORGANIZED ORGANIC THIN FILMS OF ALKALI STEARATES STUDIED BY FTIR SPECTROSCOPY AND DIFFERENTIAL SCANNING CALORIMETRY

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In recent years, a great attention has been devoted to investigation of physical properties of thin solid films built from polar organic compounds. Earlier in our experiments[a] we have detected pyroelectric properties in homogeneous organic thin films obtained by vacuum deposition (VD) of stearic salts of alkali metals (LiSt, NaSt, KSt). In the present paper we have studied the dependence of thermal behaviours on the number of layers in VD films of LiSt and NaSt using temperature dependent FTIR spectroscopy and differential scanning calorimetry (DSC). These substances belong to the class of ionic liquid crystals, and being heated undergo the series of phase transitions from solid crystal to isotropic liquid. By FTIR spectroscopy, we have determined the orientations of alkyl radicals and carboxylic groups in the films with temperature variation, and also have shown that they depend on the number of layers in the film. It was found that film heating from 20 up to 110^oC leads to decrease of the tilt of alkyl radicals with respect to the surface normal for NaSt films. This decrease is accompanied by changes in orientation of CO_2^- groups. It means that specific molecular arrangement is formed in the film, that can produce an overall spontaneous polarization in the direction of the surface normal. The investigation of LiSt films has not reveal such a behaviour in accordance with low pyroelectric response.

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[a] A.Borovikov, L.Levash, A.Naumovets, G.Puchkovskaya, V.Samoilov, and V.Styopkin, Ferroelectrics, 192(1997)323.