

## Nanocomposites and nanomaterials

### **Influence of low temperature on deformation changes the structure of the polyimide film PMA**

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Polyimide is a molecular substance (MS), which has a strong interaction within the molecules and the weak (van der Waals) interaction between molecules [1,2]. Such objects are randomly distributed molecules. On X-ray patterns MS appear as a diffuse halo which indicates on short-range order.

The purpose of the present work was to study the influence of low-temperature deformation on the X-ray scattering intensity and suggestions an interpretation of these parameters on the structure of polyimide films.

Samples for the experiments took the form of strips dimensions 70x5x0,08 mm<sup>3</sup>. X-ray diffraction studies were performed on a DRON-2.0. Measurements were carried out over a wide range of angles.

As a result of deformation the temperature of liquid nitrogen in the films two regions with different densities were formed. It was found that the deformation of films at liquid-helium temperatures, does not lead to significant changes in the structure of the film. Assuming that the film consists of quasi-linear chain molecules, two "mechanism" has been proposed. These "mechanisms" are qualitatively describe the processes taking place in the polyimide films PM-A after deformation at low temperatures.

1. *A.I. Prokhvatilov*, Plasticity and Elasticity of Cryocrystals // Begell House, USA, New York (2001).
2. *V.G. Manzhelii and Yu.A. Freiman*, Physics of Cryocrystals // AIP Press, Woodbury, New York (1996).