

FORMATION OF THE LIQUID-CRYSTALLINE PHASE IN POLY(DI-n-HEXYLSILANE)

*N.I. Ostapenko*¹, *Y.V. Ostapenko*¹, *O.A. Kerita*^{1,2}

¹Institute of Physics, Nat. Acad. of Sci. of Ukraine
(46, Nauky Prosp., Kyiv 03028, Ukraine;
e-mail: *ostap@iop.kiev.ua*),

²National Technical University of Ukraine

“Kiev Politechnic Institute”

(37, Prosp. Peremogy, Kyiv 03056, Ukraine)

S u m m a r y

We studied the formation of the liquid-crystalline (LC) phase in a poly(di-n-hexylsilane) (PDHS) film at the heating above the thermochromic transition temperature and its evolution, when the samples are cooled to room temperature. For this purpose, we measured the absorption (293–413 K) and luminescence (5 K) spectra depending on the annealing temperature, annealing modes, film thickness, and molecular weight of the polymer. It is shown that the formation of two LC phases at the heating of the film is associated with the appearance and a transformation of the positions and the intensities of two new absorption bands in the region of *gauche*-conformation, as well as the appearance of two bands in the region of *trans*-conformation of the cooled film. It is assumed that the formation of two LC phases is due to the existence of two absorption centers, which correspond to different distributions of the segment lengths in neat polymer. It is shown that, in the polymers with three different lengths of a Si-backbone (18, 50 and 180 nm), the LC phase reliably appears only in the polymer with the length of the Si-backbone of about 50 nm. We associate the appearance of new wide bands in the absorption spectrum of the annealed PDHS film after the cooling to room temperature with the defect states related to residual phenomena arising after the transition of the thermally treated film from the LC state to *trans*-conformation.