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FEATURES OF THE ACTION OF A HIGH-POWER ION BEAM ON POLYETHYLENE TEREPHTHALATE

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The modification of the surface properties of polymers, transformation of their surface layers into nanostructured carbon under the action of a high-power ion beam (HPIB) of nanosecond duration are of great interest, both from a scientific and practical point of view. The high temperatures resulting from such exposure lead to melting, intensive evaporation and decomposition of polymer materials. For most polymers, under such influence, intense pore formation is observed in the surface layer.

The features of the action of HPIB on a widely used polymer - polyethylene terephthalate (PET) have been investigated. The samples were irradiated at the Temp accelerator with a proton-carbon beam (30% H^+ +70% C^+, E ~ 200 keV, j ≤ 150 A/cm^2, τ=60 ns) with varying ion current density and the number of irradiation pulses.

It has been established that HPIB irradiation leads to the formation of various surface formations on the PET surface having an internal periodic structure with a characteristic size of ~ 20 μm. At the same time, the formation of surface pores (primarily closed or semi-open) is minimal compared to other previously irradiated polymer materials. Multiple (>10 pulses) HPIB irradiation leads to the formation on the PET surface of a complex system of periodic protrusions of a solidified polymer melt with a period of ~ 150 μm. The height of the protrusions is up to 80 μm and the average diameter is ~ 35 μm.

Possible mechanisms of the formation of PET morphology under the action of HPIB are considered taking into account the peculiarities of the thermo-physical characteristics of PET.