

Etching of nanopores in polycarbonate irradiated with swift heavy ions at 15 K

Apel PY, Akimenko AP, Blonskaya IV, Cornelius T, Neumann R, Schwartz K, Spohr R, Trautmann C
*NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION B-
BEAM INTERACTIONS WITH MATERIALS AND ATOMS 245 (2006) 284-287*

Temperature effects on the formation of ion tracks in polycarbonate at different energy losses have been investigated. Samples of polycarbonate foils Makrofol were irradiated at 298 K and 15 K with Ni and U ions of initial energy 11.1 MeV/u. The conductometric method was applied to monitor the etching process. The etching Curves clearly reveal different zones of damage around the ion path. Both the diameters of the track core and the halo increased with increasing energy loss dE/dx . The size of the track core was independent of temperature, whereas the diameter of the track halo wits considerably smaller for samples irradiated at 15 K. This observation gives evidence that heat-activated secondary processes play a significant role during the formation of the track halo. Irradiation at low temperatures confines the radiation damage within a smaller volume which is of interest for nanotechnological applications because it may help to reduce the minimum size of etched pores.