

Tracks of very heavy ions in polymers

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A comparative study of latent and etched track parameters in various polymers is performed with the emphasis on the tracks of very heavy particles such as ^{238}U ions in the energy range of 1-11.6 MeV/u. Samples of polyethylene terephthalate (PET), polypropylene (PP) and polysulphone (PSU) films were irradiated with heavy ions of various masses. The etching kinetics of the tracks in PET were investigated by a conductometric technique. The sizes of a highly damaged "track core" and a cross-linked "halo" were derived from the kinetics of the etching curves for the ions of various masses. The ratio of track to bulk etch rate, V , was determined as a function of the ion energy loss, dE/dx . In the case of PP a distinct maximum of the $V(dE/dx)$ function at $dE/dx = 7$ keV/nm was observed. No profound increase of V was observed when passing from Xe to U tracks in both PET and PSU. Obviously, at very high energy losses the destruction and construction processes coexist and the relative role of construction increases at a certain level of dE/dx . The experimental data seem to indicate that accelerated ions of moderate masses are favoured for the production of structures with a high aspect ratio.