

Guided transmission of Ne⁷⁺ ions through nanocapillaries in insulating polymers: Scaling laws for projectile energies up to 50 keV

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The guiding of multiply charged Ne⁷⁺ ions through nanocapillaries in highly insulating polymers was investigated. Highly parallel capillaries with a density of $\lesssim 10^7 \text{ cm}^{-2}$ and diameters of $\lesssim 100 \text{ nm}$ were utilized. The widths of the angular profiles were measured for Ne⁷⁺ ions transmitted through the capillaries. Moreover, the fractions of transmitted ions were measured as a function of the capillary tilt angle. The results were used to evaluate the characteristic guiding angle, which is a measure of the *guiding power* specifying the ability of a material to guide ions. Results for the polyethylene terephthalate (PET) and polycarbonate (PC) samples were compared to verify the role of the material of the capillary wall. Relatively high projectile energies of up to 50 keV were used to extend the validity of previous scaling laws based on the projectile charge-to-energy ratio. The profile widths and the guiding angles for both polymers are found to compare well with the scaling laws showing that PET and PC have nearly equal guiding properties.