

Enhancement of etch rate for preparation of nano-sized ion-track membranes of poly(vinylidene fluoride): Effect of pretreatment and high-LET beam irradiation

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We investigated how pretreatment and high-LET beam irradiation affected the ion-track dissolution rate in poly(vinylidene fluoride) (PVDF) films by SEM observations and conductometric analysis in order to develop the preparation methodology of nano-sized ion-track membranes. PVDF thin films irradiated with four types of ion beams were exposed to a 9 mol/dm³ KOH aqueous solution after their storage in air at 120 °C. This heating treatment was found to enhance the etch rate in the latent track, both in the inner core and outer halo regions, without changing that in the bulk, probably due to the formation of parasitic oxidation products facilitating the introduction of the etching agent to improve the etchability. Additionally, the irradiation of heavier higher-LET ions, causing each track to more activated sites (like radicals), was preferable for achieving effective etching.