

Substrate-specific functional membranes based on etched ion tracks

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A novel thin membrane synthesized by copolymerizing diethyleneglycol-bis-allylcarbonate (CR-39) with a minor amount of acryloyl-L-proline methyl ester (A-ProOMe) was etched by an aqueous NaOH solution after a 6.19 MeV/n ⁸⁴Kr ion irradiation to produce ion-track membranes. The ion-track membranes were chemically modified by radiation-induced grafting of A-ProOMe. We found that a polymer gel of A-ProOMe shows a characteristic volume phase transition around a lower critical solution temperature (LCST) of 14°C, namely thermo-responsive function. The changes in size of pores in the grafted membrane under different temperatures in water were measured by both the scanning electron microscopy (SEM) and the atomic force microscopy (AFM). The pore was controlled from an open state above LCST to a completely closed state below LCST. The permeability of *p*-nitrophenol through the grafted membrane was also measured by changing the temperature of the cell.