

Closure characteristics of a thermally responsive single ion track pore determined by size exclusion method

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Cross-linked poly(N-isopropylacrylamide) (NIPAAm) gel was grafted on the wall of a single ion-track pore in poly(ethylene terephthalate) (PET). The opening and closing of the pore is controlled by temperature and observed by electric conductivity. In the shrunken state of the gel, ions and molecules can penetrate the membrane through the free volume of the pore. In the swollen state, the gel clogs the pore. Using mixtures of polyethylene glycol (PEG) of various molecular weights and 0.1 N potassium chloride, it was demonstrated that the responsive pore acts as a thermally controllable valve preventing the passage of PEG molecules larger than 2 nm. The mean value of the hydrogel mesh size is estimated to be (1.3 ± 0.05) nm.