

Surface Modification of Polysulfone Membrane Irradiated by hundreds eV of Ar⁺ ion with Oxygen Gas Flow

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Polysulfone has been broadly investigated as a membrane material. However, the polysulfone membrane has hydrophobic surface, which leads to the reduction in the filtering flow rate of polar solvent. IAR(ion-assisted reaction) are recently illuminated for improving the wettability of polymer surface. Argon was ionized by cold hollow cathode ion source, and acceleration energy was changed from 300 to 1000 eV. Base pressure was 5×10^{-6} and working pressure $1.0 \sim 2.4 \times 10^{-4}$ Torr. Contact angle of polysulfone to triple distilled water was measured by a contact angrometer. Surface morphology was investigated by scanning electron microscopy. X-ray photoelectron spectroscopy was used to analyze the chemical state of polysulfone membrane irradiated by the Ar⁺ ion beam. In this study, the surface of polysulfone membrane was activated by irradiation of the Ar⁺ ion beam. During the irradiation, oxygen gas was successively flowed onto the polymer surface. The oxygen gas flow was 0, 4, 6, and 8 sccm. The hydrophobic surface of polysulfone membrane became a hydrophilic by the ion-assisted reaction under oxygen environment. The contact angle of polysulfone membrane to triple distilled water was changed from 85° to 12°. The minimum contact angle was achieved at the condition of 300 eV acceleration potential, 1×10^{15} ions/cm² ion dose and the oxygen flow rate of 6 sccm.

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