DEPOSITION OF NANOSIZED POLYMER FILMS ONTO TRACK-ETCHED MEMBRANE SURFACE OBTAINED BY PLASMA POLYMERIZATION OF HEXAMETHYLDISILAZANE

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The structure, surface and electrochemical properties of polypropylene track-etched membrane with a polymer layer obtained by plasma polymerization of hexamethyldisilazane have been studied.

The synthesis and characterization of the polymer bilayer composite membranes prepared by deposition of thin films formed on one side of a porous substrate using a plasma polymerization method were studied. Polypropylene track-etched membrane (PP TM) with thickness of 10.0 μm and pore diameter of 300 nm (pore density of 10^8 cm^{-2}) were used as porous substrates. To produce the membrane, PP-foil Torayfan T2372 (Toray Co., Japan) was irradiated by xenon ions accelerated at the cyclotron and then subjected to physicochemical treatment using the method described in [1]. The deposition of the polymer films on the membrane surface was conducted by RF-discharge (100 W, 13.56 MHz) [2] generated at a working pressure of 0.7 Pa established by a mixture of argon, used as feed gas, with hexamethyldisilazane (HMDSN) vapors used as precursor. The deposition time was varied.

The membrane characterization was carried out by atomic force microscopy (AFM), the surface properties were characterized by measuring the water contact angles, and the chemical structure was investigated by X-ray photoelectron spectroscopy (XPS) and Fourier-transformed infrared spectroscopy (FTIR) in attenuated total reflectance (ATR) mode. The measurements of the current-voltage characteristics of the membranes were carried out with a direct current regime in the voltage range of –1 to +1 V using a PC-controlled potentiostat ‘Elins P-8S’ (Russia) with a scan rate of 50 mV/s. A two-chambered cell with Ag/AgCl electrodes, containing a water solution of potassium chloride of identical concentration on both sides of the membrane was used for this purpose.

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REFERENCES

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