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Enhance of hydrophilicity property for gas separation membrane by DC plasma

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Preparation and surface modification of Polysulfone (PSF) membranes by DC plasma were conducted in order to improve membrane hydrophilicity and gas permeation efficiency. Different type of oxygen (O_2), Argon (Ar), Argon (Ar)/oxygen (O_2) mixture plasma and plasma sequence of O_2 and Ar gasses were employed to modify the membrane surfaces. Characteristics of membrane samples were evaluated through various analytical techniques. Membrane hydrophilicity was determined by water contact angle (WCA) measurement while Fourier transform infra-red (FTIR) spectroscopy was used to analyze the functional groups on the modified surface membrane. We studied the aging condition by measuring the WCA of the plasma-treated surface membrane that recovering to the original condition. For gas separation, the result shows that the permeability of CO_2 is higher than of CH_4 that were explained by electronic properties, polarizability and quadrupole moment. Result also indicated that while the gas permeability of the treated membrane by DC plasma was enhanced but the selectivity of CO_2/CH_4 show a lower performance.

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