HOLLOW FIBER MEMBRANE SURFACE MODIFICATION USING NEAR ATMOSPHERIC PRESSURE PLASMA

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Introduction

Polysulfone(PSF) hollow fiber membrane widely used in many applications such as water purification process and other microfiltration. However, the membrane to be used in many applications must modify the surface to improve hydrophilic properties of the membrane for the proper applications. The traditional methods involve chemical reaction in a liquid solution that causes the waste of the environment. Low-pressure plasma, such as DC plasma, has widely used to modify flat sheet membrane surface that gave the appropriate result. However, such plasma cannot treat regularly throughout the hollow fiber membrane surface.

Description of the Work or Project

Near atmospheric pressure plasma (NAPP) was generated inside the pyrex tube which has inside diameter of 7 mm and outside diameter of 9 mm. Argon was used as working gas generated by RF power supply with the power of 30 W and frequency of 142 kHz. Polysulfone(PSF) hollow fiber membrane sample was put inside the pyrex tube for 30 s and 60 s, respectively. The change of surface wettability of these different parts of the PSF hollow fiber membrane samples were determined by water contact angle(WCA) measurement and their surface energy evaluation. In addition, the surface morphology of the PSF membrane samples were studied comparing to the untreated membrane sample by Atomic Force Microscopy (AFM). The results show that the hydroplilicity of the treated hollow fiber membrane using NAPP technique increase regularly throughout the various operating conditions.

Conclusions

The PSF hollow fiber membrane surface can be modified to improve their hydrophilicity by using near atmospheric pressure plasma discharges. The treated PSF hollow fiber membrane surface was uniformly modified by NAPP technique and could be determined by WCA and AFM analysis.

Keywords: atmospheric pressure plasma; hollow fibre membrane; surface modification.