

## Improving the Hydrophobicity of Polyvinylidene Fluoride Porous Membranes by Atmospheric Pressure Plasma Intermittent Etching

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The main purpose of this study is to investigate the effect of Ar atmospheric pressure plasma (APP) treatment on the change of its hydrophobicity. The optimum parameters of the plasma treatment were obtained as the duration treatment time of 1 min, power of 250 W, Ar gas flow rate of 10 L/min, and moving speed of 10 mm/sec, meanwhile the contact angle of PVDF membranes showed the highest value under this condition. The surface free energy calculated by the Owens–Wendt (OW) method revealed that the surface free energy of the modified PVDF membrane decreased a lot while showing almost zero value of polar component. Through XPS analysis, we qualitatively and quantitatively confirmed that C content is somewhat increase of plasma–modified PVDF membrane, and it also contains more O and less F. SEM results can be also seen that brushes and “phenyl” morphology of the modified PVDF also occur in the pores of membrane, which may result in zero value of polar component due to the good diffusive properties. Finally, during the surface treatment of PVDF membranes in the plasma flame, we observed the larger size of pore, which leads to the decrease in the BET surface area.