

## **Improvement of Properties and Performances of Polyethersulfone Ultrafiltration Membrane by Blending with Bio-Based Dragonbloodin Resin**

### **ABSTRACT**

Polyethersulfone (PES) is the most commonly used polymer for membrane ultrafiltration because of its superior properties. However, it is hydrophobic, as such susceptible to fouling and low permeation rate. This study proposes a novel bio-based additive of dragonbloodin resin (DBR) for improving the properties and performance of PES-based membranes. Four flat sheet membranes were prepared by varying the concentration of DBR (0–3%) in the dope solutions using the phase inversion method. After fabrication, the membranes were thoroughly characterized and were tested for filtration of humic acid solution to investigate the effect of DBR loading. Results showed that the hydrophilicity, porosity, and water uptake increased along with the DBR loadings. The presence of DBR in the dope solution fastened the phase inversion, leading to a more porous microstructure, resulted in membranes with higher number and larger pore sizes. Those properties led to more superior hydraulic performances. The PES membranes loaded with DBR reached a clean water flux of 246.79 L/(m<sup>2</sup> ·h), 25-folds higher than the pristine PES membrane at a loading of 3%. The flux of humic acid solution reached 154.5 ± 6.6 L/(m<sup>2</sup> ·h), 30-folds higher than the pristine PES membrane with a slight decrease in rejection (71% vs. 60%). Moreover, DBR loaded membranes (2% and 3%) showed an almost complete flux recovery ratio over five cleaning cycles, demonstrating their excellent antifouling property. The hydraulic performance could possibly be enhanced by leaching the entrapped DBR to create more voids and pores for water permeation.