

POLYDOPAMINE MEDIATED SELF-CLEANING OF HIGH-FLUX PH-RESPONSIVE ISOPOROUS MEMBRANES FOR FILTRATION APPLICATIONS

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A major challenge in membrane filtration is fouling which reduces the membrane performance. The fouling is mainly due to the adhesion of foulants on the membrane surfaces. In this work, we studied the fouling behavior of polystyrene-*b*-poly(4-vinylpyridine) (PS-*b*-P4VP) isoporous membrane and the mussel inspired polydopamine/L-Cysteine isoporous zwitterionic membrane. The polystyrene-*b*-poly(4-vinylpyridine) (PS-*b*-P4VP) isoporous membrane was fabricated via self-assembly and non-solvent induced phase separation.¹ Subsequently, the isoporous membrane was modified through a mild mussel-inspired polydopamine (PDA) coating by retaining the isoporous morphology and water flux.² Furthermore, zwitterionic L-Cysteine was anchored on the PDA layer coated membranes via Michael addition reaction at neutral pH and 50°C. The membranes were thoroughly characterized using X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), atomic force microscopy (AFM) and zeta potential measurements. The contact angle and dynamic scanning calorimetry (DSC) measurements were carried out to examine their hydrophilicity. The pH-responsive behaviour of the modified membrane remains unchanged and the antifouling ability after PDA/L-Cysteine functionalization was improved. The modified and unmodified isoporous membranes were tested using humic acid and natural organic matter contaminated solutions at 0.5 bar feed pressure.

References

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