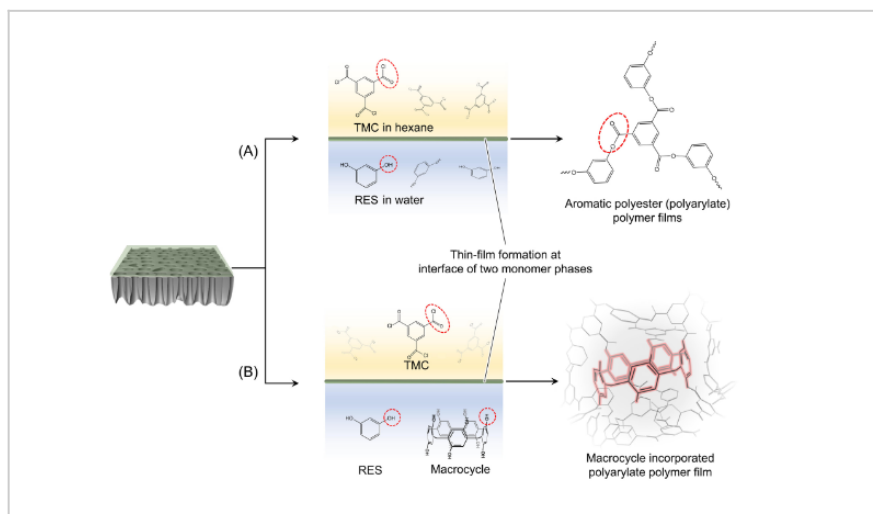


Interfacially Polymerized Membranes for Molecular Separations

ID# 2018-4769



PennState



TECHNOLOGY READINESS LEVEL

4-7

Seeking

Licensing |

Keywords

- TFC Membranes
- Hydrocarbon Gas Separations
- Water Purification and Desalination
- CO₂ capture
- Reverse Osmosis

Researchers

Manish Kumar

Associate Professor

Woochul Song

Graduate Student

Yue-xiao Shen

Post-doctoral Researcher

Other Researchers

Chao Lang

Originating College

College of Engineering

Office of Technology Management Contact

Smith, Matthew

mds126@psu.edu

814-863-1122

Technology Summary

The present invention pertains to a TFC membrane comprising a small-molecule channel element within a polymeric matrix element on a porous support to provide tunable microporosity at the Angstrom scale. The channel element is highly uniform and tunable, enabling a solution flow mechanism that enhances solvent permeability while retaining molecular selectivity. The TFC membrane exhibits over twice the permeance of leading membrane technologies with comparable selectivity. Select examples of separations demonstrated to date include water small molecule separations, alcohol water separations, C₄ hydrocarbon separations (1-butene, iso-butene, iso-butane, and n-butane). Other separations that could be enabled include NaCl from water, hydrogen sulfide from methane, carbon dioxide from methane, oxygen from air, nitrogen from air, and benzene from ethanol.

Application & Market Utility

This invention comprises novel TFC membranes containing a small molecule pore element separated from a polymeric matrix element, enabling enhanced performance for gaseous, aqueous, organic solvent, and small molecule separation relative to leading membrane technologies. Preliminary membrane test results show selectivity performance around ~70 to ~300, indicating impactful savings in industrial processes (compared to conventional distillation processes).

Next Steps

We are seeking a commercial licensing partner. Samples can be made available upon request.



Invent Penn State is a Commonwealth-wide initiative to spur economic development, job creation, and student career success. Invent Penn State blends entrepreneurship-focused academic programs, business startup training and incubation, funding for commercialization, and university-community collaborations to facilitate the challenging process of turning research discoveries into valuable products and services that can benefit Pennsylvanians and humankind. Learn more at invent.psu.edu.

Penn State is an equal opportunity, affirmative action employer, and is committed to providing employment opportunities to all qualified applicants without regard to race, color, religion, age, sex, sexual orientation, gender identity, national origin, disability or protected veteran status.