The Department of Civil and Environmental Engineering at the University of Houston presents...

CIVE 6111 Graduate Seminar

Organic Solvent Nano-Filtration Using Covalent Organic Frameworks and Unravelling the Effect of Solvent-Membrane Interactions on Permeate Flux

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2:45pm-3:45pm
Classroom Business Building (CBB) - Room 122
Zoom: https://uh-edu-cougarnet.zoom.us/j/98395307671

Abstract
Organic solvent nanofiltration (OSN) offers an energy-efficient alternative to conventional thermal separation methods for recovering pure organic solvents and separating organic solvent mixtures. Covalent organic frameworks (COF) membranes can achieve high throughput and selective separation in the OSN process because of their crystalline structure, which yields a high density of uniform pores. Through judicious selection of COF monomers, the pore sizes and thicknesses of the resulting membranes may be tuned. Additionally, many COFs chemistries, such as the b- ketoenamine-linked COF system, are resistant to commonly used industrial and pharmaceutical organic solvents. Despite their potential for OSN applications, the development of COF membranes for organic solvent separations has been hindered by a lack of understanding of the specific solvent-membrane interactions that affect solvent transport through these membranes. In this work, we applied Hansen Solubility Parameters (HSPs) to describe membrane-solvent interactions that influence organic solvent permeation through b-ketoenamine-linked COF membranes. The chemical and physical properties of two different COF membranes were characterized, and the HSPs were measured. Hansen Solubility Parameters were correlated to the permeances of a library of different organic solvents to develop a predictive model of solvent flux. We validated this model by applying it to predict the fluxes for different solvent mixtures and the results were in a good agreement with the predicted values for fluxes of these solvent mixtures.

Bio
Parisa Taheri is a PhD student in the department of Civil and Environmental Engineering working under supervision of Dr. Devin L. Shaffer. Her research is focused on better-performing membrane materials for industrial applications, such as produced water treatment and organic solvent nanofiltration. Parisa's current projects include designing membranes tailored for membrane distillation of produced water; scalable synthesis of contorted polyamide membranes and their application for water desalination; and modeling mass transport in these novel membrane materials. She also researches covalent organic framework membranes to understand and predict the separation performance of COFs in organic solvent nanofiltration.