EMS 1982
European Membrane Society

Webinar

29th July, 2026
15:00 CET

Dr. Banan Alhazmi

Winner of EMS Best Paper Award 2025

"Crown Ether Membranes for Precise Pharmaceutical Fractionation"

Separations are fundamental to the chemical and pharmaceutical industries, often involving complex and energy-intensive purification processes. Organic solvent nanofiltration offers a promising low-energy alternative, but its broader adoption requires membrane selectivity beyond what is currently available.

This webinar presents selective nanofilms composed of fully crosslinked crown ethers for pharmaceutical fractionation. The membranes are fabricated using interfacial polymerization, where the macrocycle is covalently incorporated as the primary building block rather than a post-synthetic additive or co-monomer. The resulting membranes exhibit up to 90% higher selectivity and acetonitrile permeance than commercial OSN membranes. Their separation performance was further evaluated using a structurally diverse pharmaceutical mixture, demonstrating complete retention of active pharmaceutical ingredients (~800 g mol^{-1}) and exceptional separation factors for challenging small-molecule pairs (100-370 g mol^{-1}). Notably, this level of molecular selectivity was absent in membranes fabricated from analogous polyether monomers lacking intrinsic macrocyclic cavities, highlighting its critical role in achieving precise molecular separations.

Dr. Banan Alhazmi recently earned her Ph.D. in Environmental Science and Engineering from King Abdullah University of Science and Technology (KAUST), Saudi Arabia, under the supervision of Prof. Suzana Nunes and Prof. Gyorgy Szekely. Her doctoral research focused on membrane materials for organic solvent nanofiltration, leading to the development of macrocycle-based membranes with enhanced molecular selectivity for pharmaceutical and fine chemical separations. Her work has been published in leading scientific journals and was recognized with the EMS Best Paper Award 2025.

Banan holds a B.Sc. in Chemical and Biological Engineering from Oregon State University and an M.Sc. from KAUST. She is a recipient of the KACST–MIT Ibn Khaldun Fellowship for Saudi Arabian Women and will join Prof. Zachary Smith's research group at the Massachusetts Institute of Technology (MIT) as a postdoctoral researcher in September 2026.

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