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「社会構想マネジメントを先導する グローバルリーダー養成プログラム」

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# High Performance Metal-Organic Framework Membranes for Olefin/Paraffin Separations


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Metal-organic frameworks (MOFs) are attractive for gas separation membrane applications due to their microporous channels with tunable pore shape, size and functionality. Conventional MOF membrane fabrication techniques, namely *in situ* and secondary growth, are generally derived from those developed for zeolite membranes. As a result, MOF membranes would eventually face similar challenges that zeolite membranes have faced for their large-scale commercial applications. These challenges include reproducibility, scalability and high manufacturing cost.

In this talk, I would like to discuss radically different strategies for large-scale MOF membrane synthesis with high gas separation performance. The new strategies are based on the fact that the coordination chemistry of MOFs is fundamentally different from the covalent chemistry of zeolites. Using the new techniques, we were able to produce continuous well-intergrown membranes of prototypical MOFs, HKUST-1 and ZIF-8 in relatively short period of time (tens of min). With a minimal consumption of precursors and a greatly simplified synthesis protocol, our new technique provides potential for continuous, scalable, reproducible and easily commercializable routes for the rapid synthesis of high performance MOF membranes. In particular, ZIF-8 membranes prepared by our new techniques show outstanding separation of propylene/propane mixtures, one of the most challenging gas separations, in contrast to those prepared by conventional solvothermal methods, indicating improved membrane microstructure.


Dr. Hae-Kwon Jeong is an associate professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University.
He joined the department as an assistant professor in 2006 immediately after finishing his postdoctoral training at the University of Illinois at Urbana-Champaign.

主催：
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