Scalable Preparation of MOF-Containing Asymmetric Mixed-Matrix Membranes for Gas Separations

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Molecular sieving metal-organic frameworks (MOFs) offer unique opportunities as membrane materials not only for polycrystalline membranes but also for mixed-matrix membranes (MMMs). Zeolitic-imidazolate frameworks (ZIFs), a sub-class of metal-organic frameworks (MOFs), are of particular interest in gas separations primarily due to their ultra-micropores (pores smaller than 5 Å) and their unusual thermal/chemical stabilities. Despite their potentials, neither polycrystalline MOF membranes nor MOF-containing MMMs have been commercialized due to both fundamental materials and processing challenges.

In this talk, I would like to discuss the current challenges of MOF-containing MMMs, in particular, their engineering challenges and then to introduce completely new approaches to address both materials and processing challenges of MMMs. Furthermore, I’ll present the unprecedentedly high propylene/propane separation performances of resulting asymmetric MMMs and explain why they show such high separation performances.