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Separation Performance of Zeolitic-Imidazolate-Framework-Based Membranes

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Metal-organic frameworks (MOFs) hold promise as gas separation membranes due to their tunable permeation properties enabled by the structural diversity stemming from the plethora of available metal/organic combinations. Among MOFs, zeolitic imidazolate frameworks (ZIFs) have been studied extensively for their potential as selective separation membranes because their unique structural properties allow them to achieve high performance for certain important separations, like that of propylene from propane. Although relatively rapid progress for highly selective ZIF membranes has been achieved, reliable and scalable thin film processing remains a challenge. In this talk, I will discuss synthesis and post-synthesis modification methods we have been developing based on vapor and liquid phase processing and use of electron-beam-, X-ray- and plasma-induced modifications. These methods may establish a new materials processing paradigm for thin film separation membranes that could allow control of structure, and composition to achieve optimal separation performance.

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