Scientific Achievement

Vapor phase ligand treatment (VPLT) enables systematic control of the permeation properties of membranes prepared using ligand induced permselectivation (LIPS).

Significance and Impact

The treatment method extends the tunability of all-vapor MOF membrane processing to unprecedented levels for specific applications.

Research Details

– Considerable amount of 2-amino-benzimidazole (2abIm) was incorporated in the LIPS-ZIF-8 membrane by VPLT achieving selectivity improvements. Notably, O₂/N₂ selectivity performance is competitive with that of optimized polymeric membranes.

Membranes by VPLT-LIPS. (a) Illustration of proposed structure and reduced effective pore of a LIPS-ZIF-8 membrane following treatment with 2abIm vapor. (b) Gas permeation properties of the treated membrane at 25 °C. (c) Membrane permselectivity of select gas pairs before and after treatment. (d) Select permeances indicate that 2abIm vapor treatment of LIPS-ZIF-8 is reversible upon subsequent treatment with 2mIm.


Work was performed at the University of Minnesota.