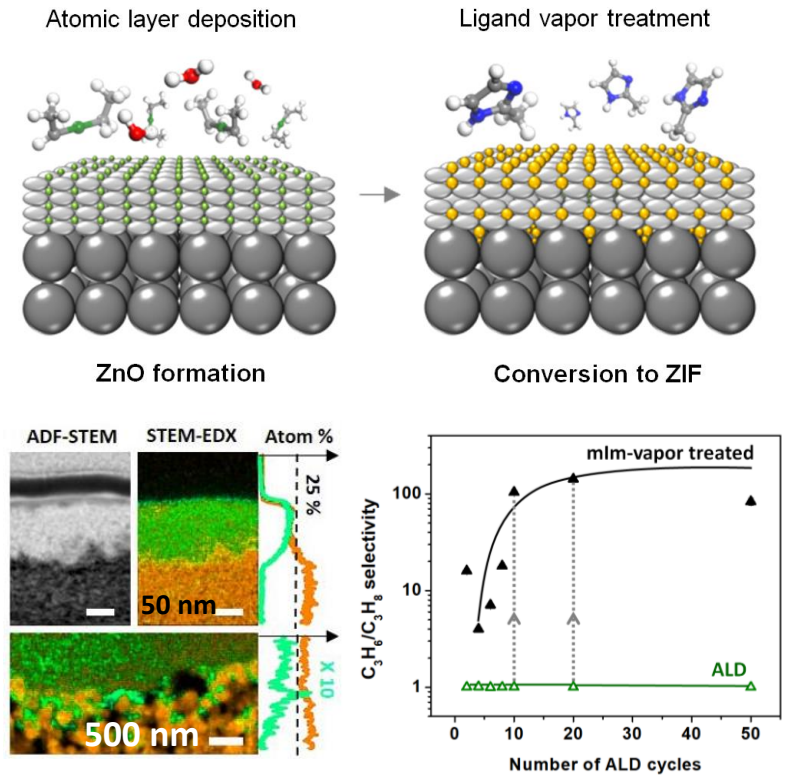


# Zeolitic Imidazolate Framework Membranes Made by Ligand-Induced Permselectivation (LIPS)



**Membranes by LIPS.** (Top) Schematic of the LIPS process. (Bottom left) Cross section annular dark-field scanning transmission electron microscopy (ADF-STEM) image of the membrane and the distribution of aluminum (orange) and zinc (green). (Bottom right) Propylene/propane selectivities of ZnO-alumina supports (open symbols) and ZIF-8 membranes (filled symbols) as a function of the number of ALD cycles.

## Scientific Achievement

Fabrication of high-performance ZIF membranes by a new all-vapor-phase (LIPS) method based on atomic layer deposition (ALD) and ligand-vapor treatment.

## Significance and Impact

The LIPS process establishes a reliable, scalable, and robust approach for the fabrication of ZIF and MOF membranes and nanocomposites.

## Research Details

- ALD of ZnO in a porous support results in an impermeable composite. After ligand-vapor (2-methylimidazole) treatment, ZnO is partially transformed to ZIF, creating a nanocomposite membrane with high propylene flux and high propylene/propane selectivity.
- The high separation performance is attributed mostly to a not well-crystallized ZIF-like deposit.

Ma, X., Kumar, P., Mittal, N., Khlyustova, A., Daoutidis, P., Mkhoyan, K.A., Tzapatsis, M., *Science* **361**, 1008-1011 (2018).

Work was performed at University of Minnesota.