Energy-Efficient Membrane Based Hydrocarbon Separation Processes

고동연†
KAIST
(dongyeunkoh@kaist.ac.kr†)

Molecular separation processes are essential in the production of clean water, pharmaceuticals, commodity and specialty chemicals, and fuels. 40-60% of the energy used in the production of these materials is spent on separation and purification processes, which amounts to approximately 10-15% of the worldwide energy consumption. In downstream chemical processes, selective removal of high-valued chemicals is required for the production of synthetic fibers, solvents, and films and is currently performed using energy-intensive techniques such as distillation, crystallization, and absorption etc... Membrane-based processes have strong potential to further reduce the energy intensity of chemical separations when advanced functional materials are integrated with the scalable membrane platform. In this talk, molecularly-selective membranes derived from carbon molecular sieve (CMS) and metal-organic framework (MOF) will be presented. These membranes have shown excellent chemical resistance, high molecular selectivity and fast mass transport across the membrane that surpassing the "polymer upper bound trade-off line" for many hydrocarbon molecular pairs.