Zeolitic imidazolate framework-L membrane improves carbon dioxide separation efficiency

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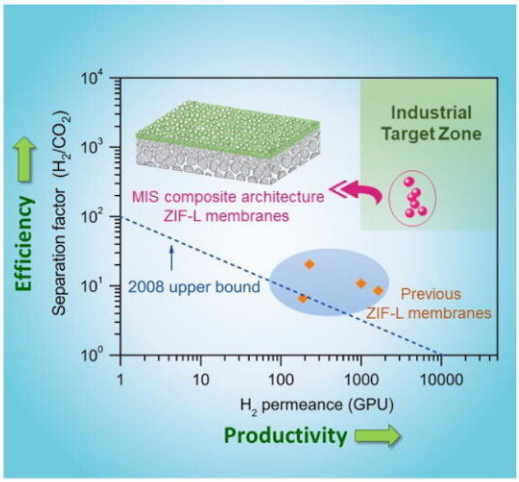

Graphical abstract. Credit: *Science Bulletin* (2021). DOI: 10.1016/j.scib.2021.05.006

Metal-organic framework (MOF) membranes are promising for energy-efficient chemical separations. However, the microstructural design of these membranes remains challenging.

Recently, a research group led by Prof. Yang Weishen and Dr. Ban Yujie from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences proposed a zeolitic imidazolate

framework (ZIF)-L membrane with a membrane-interlocked-support composite architecture for H_2/CO_2 separation.

The study was published in *Science Bulletin*.

The researchers completely confined the ZIF-L membrane into the voids of the alumina support through an interfacial assembly process, yielding membrane-interlocked-support (MIS) composite architecture. It presented apparent-zero-thickness, oriented membrane layer and strengthened crystal boundaries, which contributed to high permeance and high selectivity.

The membranes showed average H_2 permeance of above 4000 GPU and H_2/CO_2 separation factor (SF) of above 200, falling into the industrial target zone.

Furthermore, the ZIF-L membrane showed mechanical stability, scraped repeatedly by a piece of silicon rubber causing no selectivity loss.

Previously, the group collaborated with Prof. LI Weixue from University of Science and Technology of China to identify the anisotropic mass transfer rate through the two kinds of channels of ZIF-L by means of molecular dynamics simulations, providing preliminary guidance for this study.

More information: Kun Yang et al, ZIF-L membrane with a membrane-interlocked-support composite architecture for H2/CO2 separation, *Science Bulletin* (2021). DOI: 10.1016/j.scib.2021.05.006

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