

FLUE GAS PURIFICATION BY NEW NONPOROUS MEMBRANES

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Flue gas purification experiments were performed with a membrane made from the ultrapermeable polymer of intrinsic microporosity (PIM) based on tetramethyltetrahydronaphthalene unit coupled with bicyclic triptycene (PIM-TMN-Trip). Permeation experiments with a CO₂-N₂-O₂-SO₂ mixture, simulating flue gas from power plants, were performed by means of an in-house developed permeation unit. The results showed very high permeability of the membrane for sulfur dioxide SO₂ and high permeability of CO₂, lying mainly between the Robeson upper bound from 2008 and the recently reported upper bound from 2019. Moderately high mixed gas selectivity of SO₂ and CO₂ with respect to N₂ (21–29 and 11–18, respectively), in combination with very high permeability (28·10³ and 30·10³ Barrer, respectively), suggest potential use for industrial gas separation processes. The SO₂/CO₂ mixed gas selectivity was relatively low (around 1.8), but comparable with other novel membranes, and both are removed simultaneously in the process of CO₂ separation [1].

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References

[1] Stanovsky, P., Zitkova, A., Karaszova, M., Šyc, M., Jansen, J.C., Comesaña Gándara, B., McKeown, N., Izak, P. Flue gas purification with membranes based on the polymer of intrinsic microporosity PIM-TMN-Trip (2020) *Separation and Purification Technology*, 242, 116814.