Supporting Information

Tailoring a Thermally Stable Amorphous SiOC Structure for the Separation of Large Molecules: The Effect of Calcination Temperature on SiOC Structures and Gas Permeation Properties

Hiroki Inde [1], Masakoto Kanezashi [1],* Hiroki Nagasawa [1], Toshimi Nakaya [2], and Toshinori Tsuru [1]

[1] Department of Chemical Engineering, Graduate School of Engineering, Hiroshima University, Higashi-Hiroshima, 739-8527, Japan
[2] Department of Applied Chemistry, Graduate School of Engineering, Hiroshima University, Higashi-Hiroshima, 739-8527, Japan
Corresponding author (M. Kanezashi, kanezashi@hiroshima-u.ac.jp)

Temperature dependence of gas permeances for SiOC membrane

Figure S1 shows temperature dependence of gas permeances for a SiOC membrane calcined at 500 ^{o}C in N_2 atmosphere. The permeances of He and H_2 were approximately independent of temperature, and N_2, CH_4, CF_4, and SF_6 molecules showed Knudsen type permeation behavior; permeance slightly increased with decreasing temperature. The permeance of CO_2 increased with decreasing temperature, which is surface diffusion mechanism, since CO_2 molecules are adsorptive and have strong affinity with SiOC structure.

Gas selectivity for small molecules (H_2/N_2 selectivity: 5.9) was controlled by Knudsen diffusion through network pores, and for large molecules (H_2/CF_4: 240, H_2/SF_6: 1400) by molecular sieving.

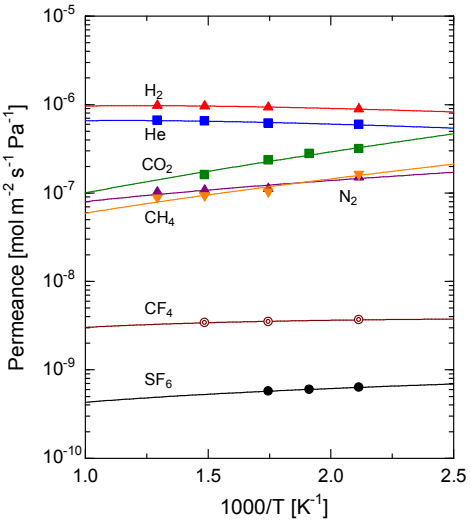

Figure S1 Temperature dependence of gas permeances for a SiOC membrane calcined at 500 ^{o}C in N_2 atmosphere