

**Development of CO₂ Separation and Recovery Technology with High Performance
CO₂ Separation Membrane for Emission Limitation of Greenhouse Gases.**

Shuji Himeno

(Nagaoka University of Technology, School of Engineering, Associate Professor)

【Outline of survey】

For suppression of global warming world-wide, reduction of CO₂ emissions and development of new energy resources should be accelerated around the world. Particularly, CO₂ recovery from thermal power stations and during drilling of petroleum and natural gas, which are potential sources of CO₂ emission, and using innovative energy-saving technologies are urgent issues. Furthermore, as new energy conversion technologies, utilization of energy from sewage sludge or food residues is sought. The objective of this study is application of a DDR-type zeolite membrane to recovery of CO₂ from natural gas and biogas. We have been developing the membrane, which has high CO₂ separation performance from methane which the primary constituent of natural gas and biogas. And this membrane has high performance especially at high pressures region. Further improvement of the membrane for possible application to CO₂ recovery technology from natural gases will be attempted. Moreover, elucidation of CO₂ separation mechanisms and construction of separation processes for practical applications will be promoted.

【Expected results】

We expect our results will broaden the application area of small molecule separation and collection such as CO₂ and hydrocarbons. Outcomes of this study of the membrane using molecular sieving of oxygen-containing eight-membered rings that DDR type zeolite possesses are expected to be applicable to new abundantly available membrane materials with other zeolite membrane having oxygen-containing eight-membered rings.

【References by the principal investigator】

- S. Himeno, T. Tomita, K. Suzuki, S. Yoshida, K. Nakayama, Synthesis and Permeation Properties of DD3R Zeolite Membrane for separation of CO₂/CH₄ Gaseous Mixtures. Ind. Eng. Chem. Res. 46:6989-6997 (2007)
- S. Himeno, T. Tomita, K. Suzuki, S. Yoshida, Characterization and Selectivity for Methane and Carbon Dioxide Adsorption on the All-Silica DD3R Zeolite, Microporous and Mesoporous Materials, 98, 62-69 (2007)

【Term of project】 FY2008—2012

【Budget allocation】

77,900,000 yen (direct cost)

【Homepage address】

<http://shwmlab.nagaokaut.ac.jp/>