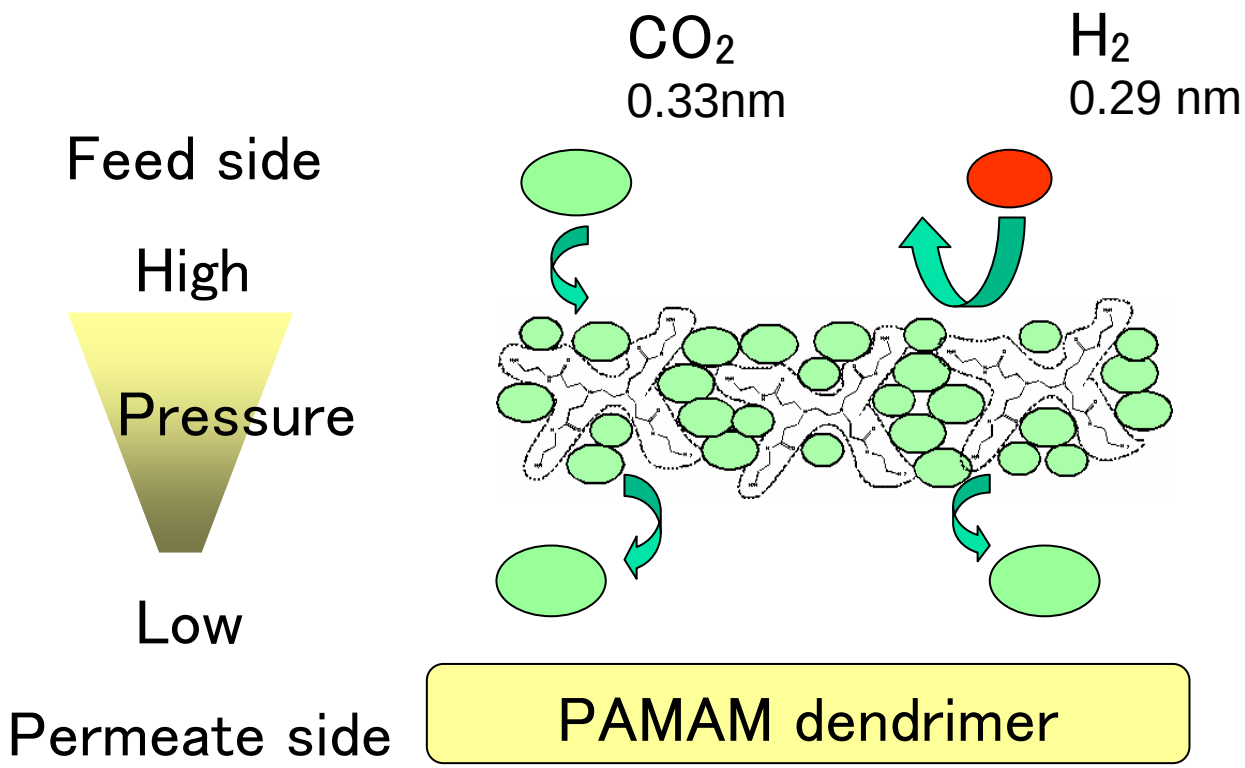
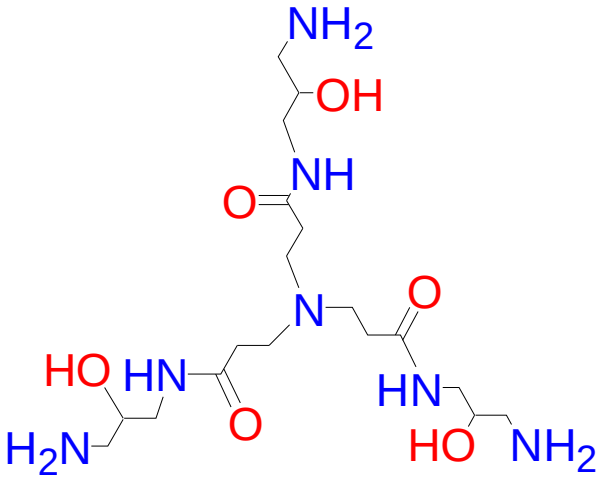
CO_2separation technology using polymeric membranes 「Molecular gate membrane」

Chemical Research Group
Research Institute of Innovative Technology for the Earth (RITE)

CO_2 separation using molecular gate membrane

CO_2 molecular gate: CO_2 in membrane ⇒ block H_2 permeation
CO_2 can permeate

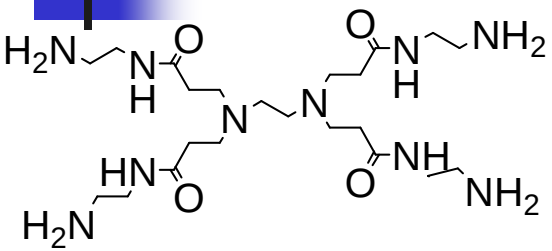




- Excellent CO_2 selectivity

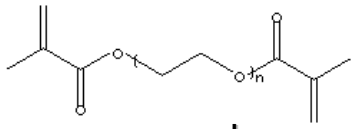
PAMAM/PEG membrane for high pressure CO_2 separation

RITE
Research Institute of Innovative Technology for the Earth



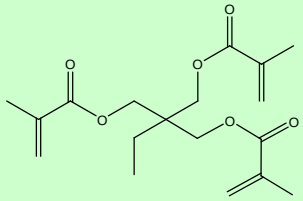
O-OH-PAMAM dendrimer

+

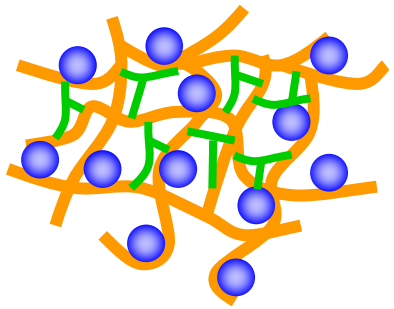


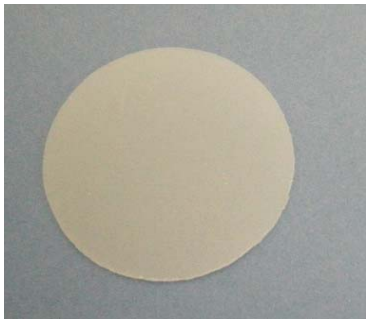
PEGDMA

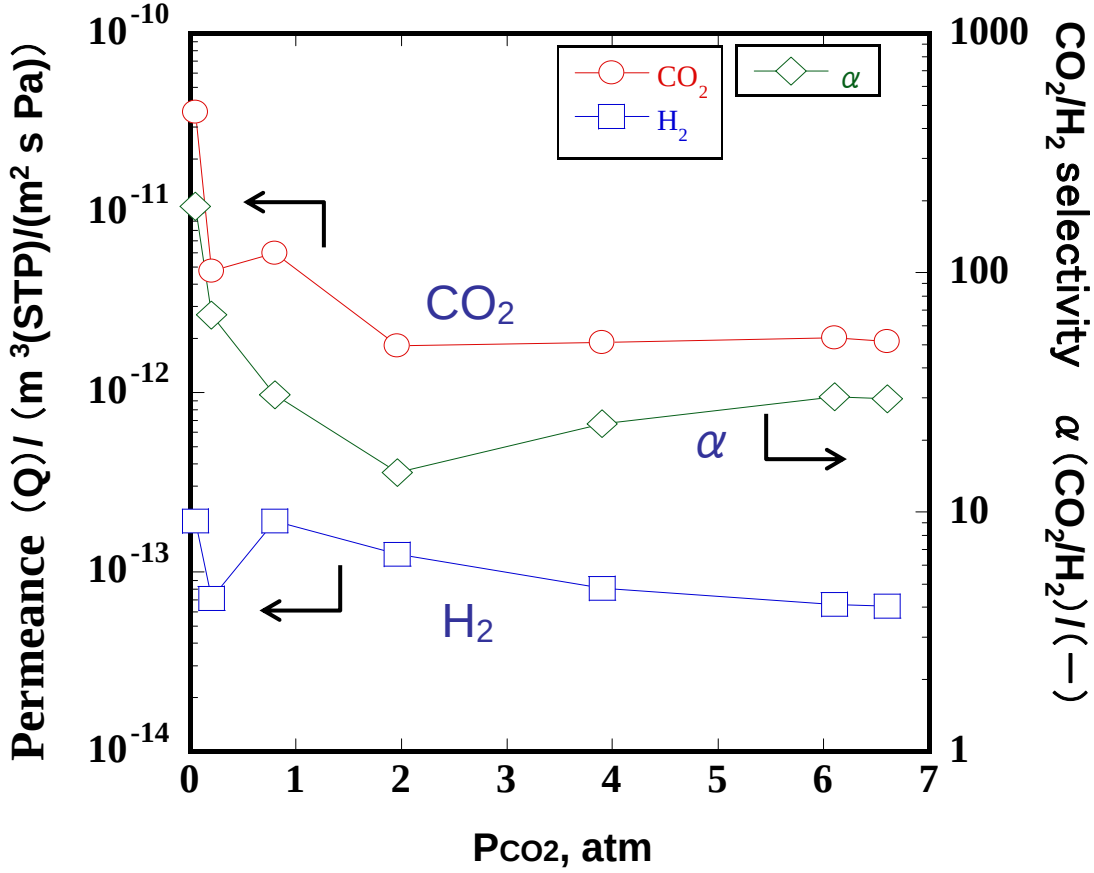
+



TMPTMA







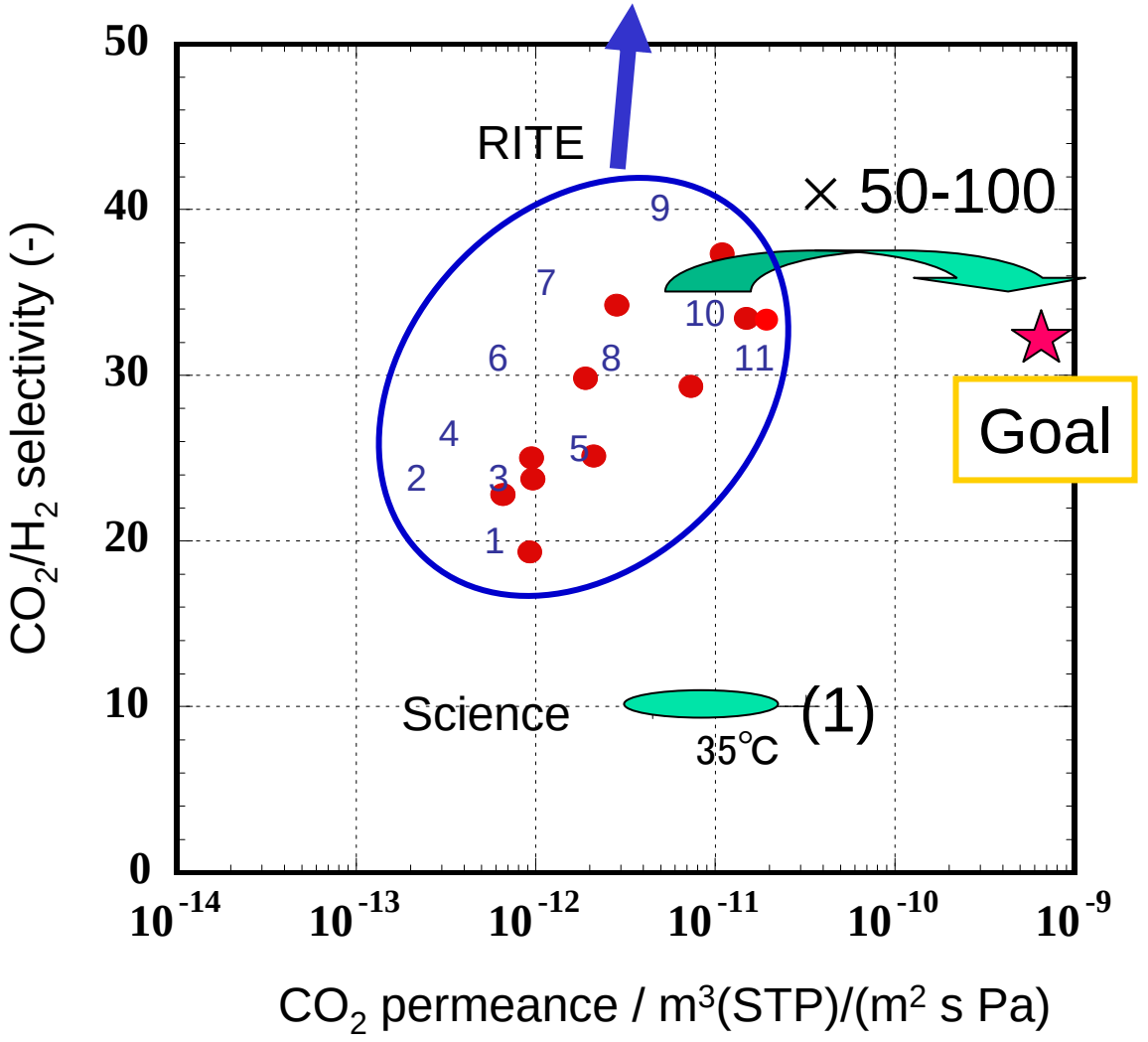
Separation performance of a PAMAM/PEG membrane

PAMAM/PEGDMA/TMPTMA = 50/37.5/12.5,
Feed : 100 mL/min, Sweep : 20 ml/min,
T = 313 K, R.H. = 80%

RITE Chemical Research Group

CO_2 separation performance of dense films and the goal

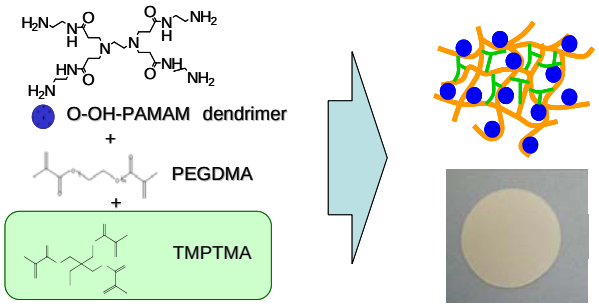
Thickness : 500 μ m ⇒ Thinning ?



(1) H. Lin B.Freeman *et al., Science*, **311**, 639-642 (2006).

Development of membrane, module and separation system*

RITE
Research Institute of Innovative Technology for the Earth



- Materials
- Membrane preparation
- Structure

Mutual Cooperation

Membrane materials (acrylate/ PVA)

Development of Membranes
(Kyoto Lab. & Kurashiki Lab.)
(RITE)

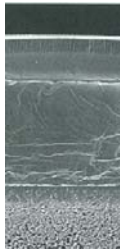
Mutual Cooperation

- Process adaptability
- Durability
- Separation mechanism

Effective R&D
by mutual cooperation

Molecular Gate Membrane module Technology Research Association

Selective layer



Membrane cross-section and Proto-type module

Development of membrane modules
(Ibaraki Lab.)

Mutual Cooperation

- Membrane module
- Module structure
- Durability

Simulated WGS gas mixture separation test system

Development of separation system
(Futtsu Lab.)

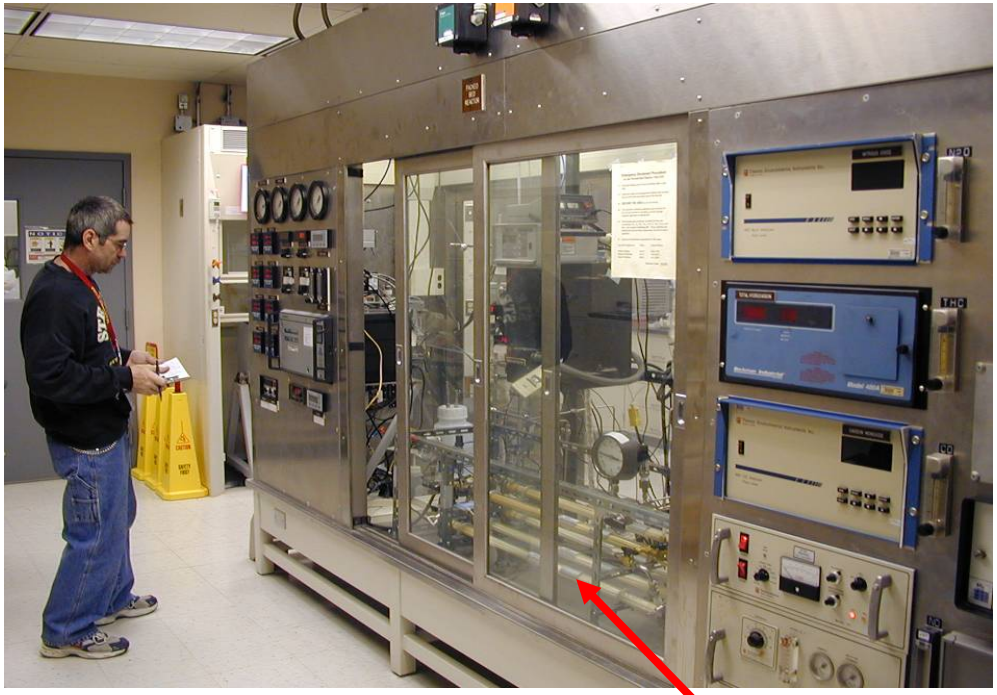
*: Molecular gate membrane module technology research association contracted from METI.

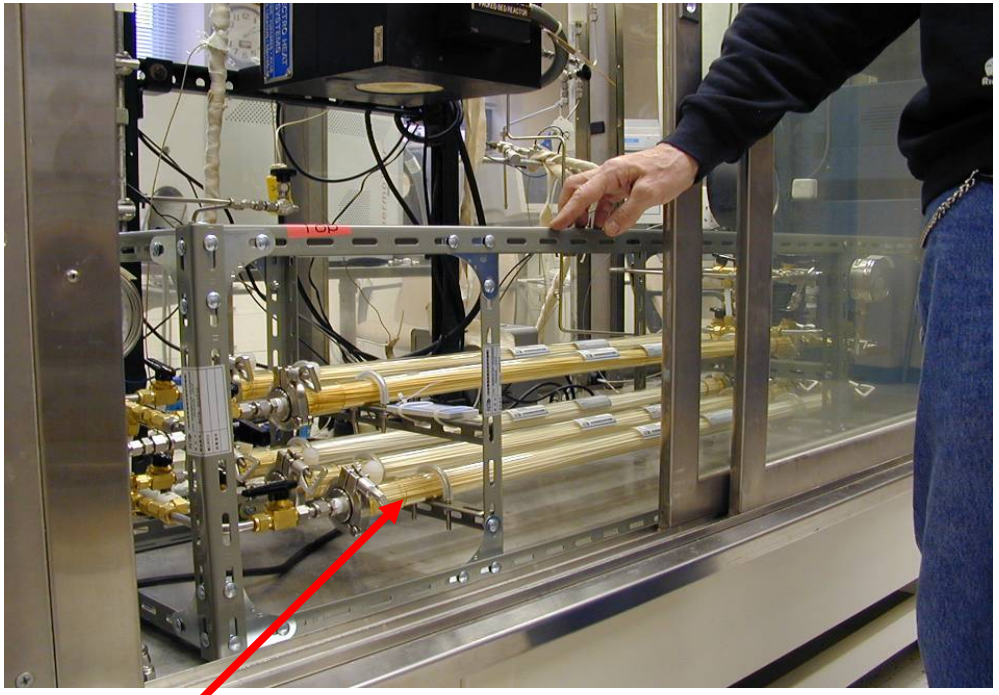
CSLF project

RITE
Research Institute of Innovative Technology for the Earth

Cooperation with DOE／NETL (USA)

Separation test at atmospheric pressure using RITE membrane modules





Molecular gate membrane module

CO_2/N_2 separation test using atmospheric pressure gas