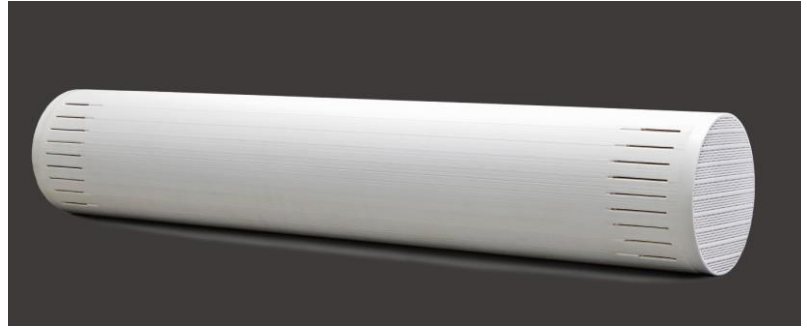


# DDR-type Zeolite Membrane



## Surprising Ceramics.

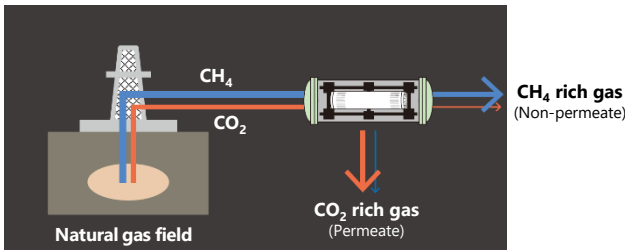
## World's largest ceramic membrane for CO<sub>2</sub> separation



## Improving separation process.

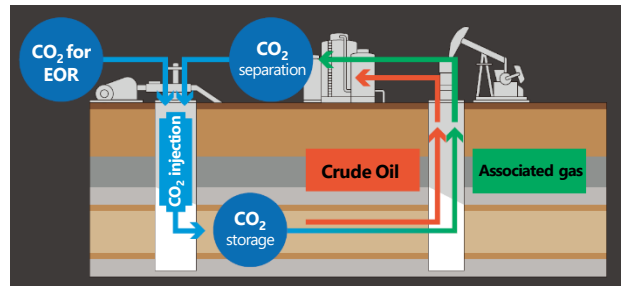
### CO<sub>2</sub> removal for natural gas & CCU/CCS

NGK's unique membrane technology innovates CO<sub>2</sub> separation processes. By selective CO<sub>2</sub> permeation, pipeline quality natural gas can be recovered on the non-permeate side. In addition, high-purity CO<sub>2</sub> suits for use or sale in CCU/CCS projects can be captured on the permeate side.



### CO<sub>2</sub>-EOR (Enhanced Oil Recovery)

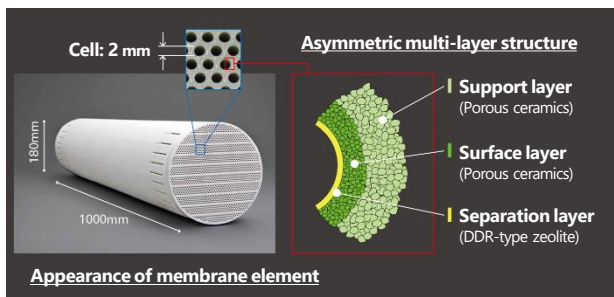
The key to successful CO<sub>2</sub>-EOR project is maximizing CO<sub>2</sub> reuse. The membrane recovers EOR-grade CO<sub>2</sub> from associated gas, thus enables to reduce the CO<sub>2</sub> cost of EOR operations.



## Selective CO<sub>2</sub> separation

### Optimized membrane element

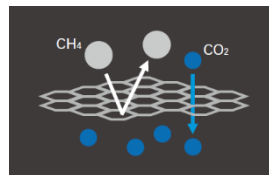
The membrane element has as much as 1,600 cells which realizes very high surface area for gas separation. Just a few micron thick separation layer (DDR-type zeolite membrane) is formed onto the inner surface of each cell.



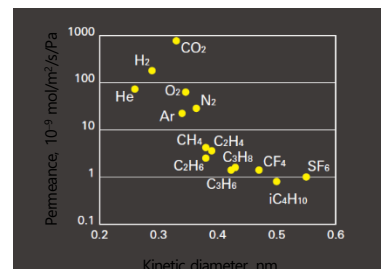
### Precise separation by uniform pores

DDR-type zeolite has desirable sub-nanopores for separating CO<sub>2</sub> from gas mixtures and high affinity with CO<sub>2</sub>. By preparing defect-free DDR-type zeolite membrane, excellent CO<sub>2</sub> permselectivity was achieved.

#### Image of molecular sieving by zeolite membrane



For further details  
Sub-nano ceramic membranes



## Contact

JGC Holdings Corporation / Hiroaki HASEGAWA (hasegawa.hiroaki@jgc.com)

NGK Insulators, Ltd. / Takeshi TOYAMA (toyama-t@ngk.co.jp)