

# PROJECT 19 – NOVEL STRUCTURED CERAMIC MEMBRANE FOR CH<sub>4</sub> / CO<sub>2</sub> SEPARATION

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Research Centre  
for Gas Innovation

cleaner energy for a sustainable future

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# Contextualization

Brazilian pre-salt

Natural gas production

methane gas (CH<sub>4</sub>)  
carbon dioxide (CO<sub>2</sub>)

CO<sub>2</sub>

reduces the energy content of the mixture

limiting its application for industrial activities and combustion processes

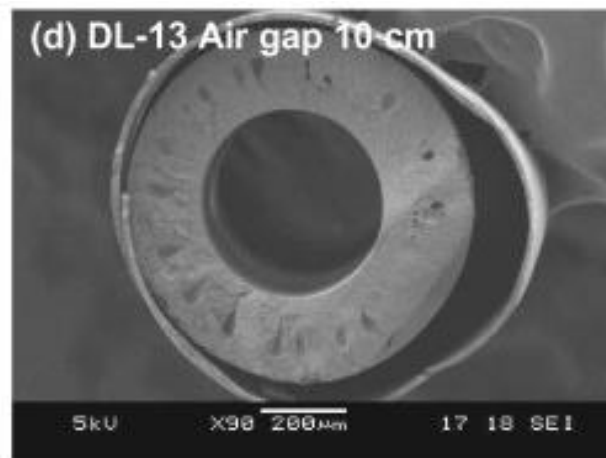
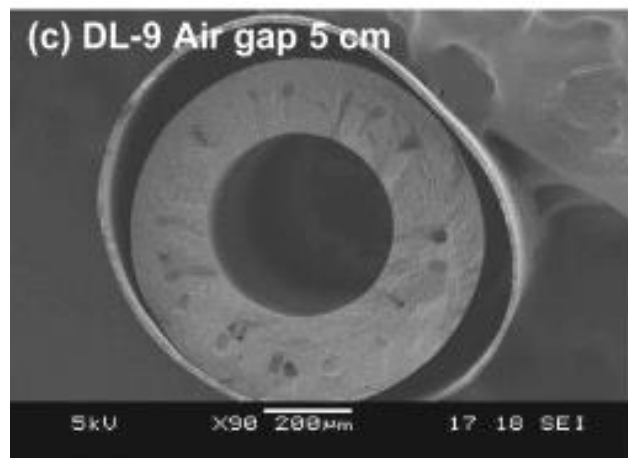
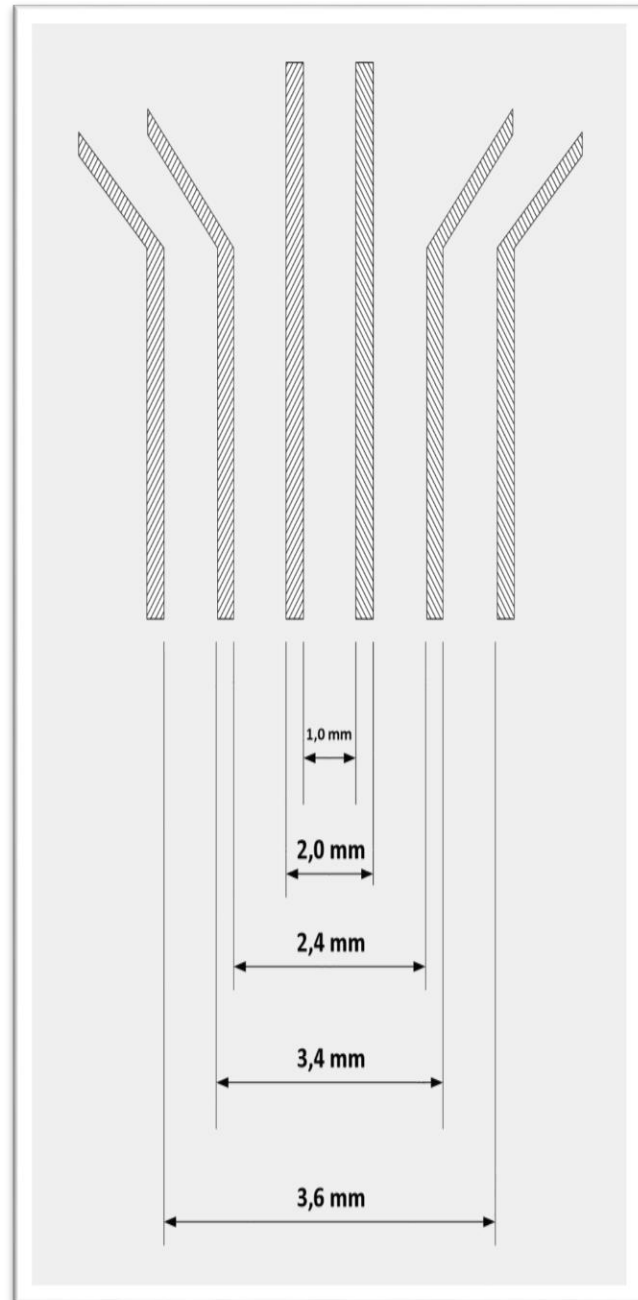
Ceramic membranes

high separation efficiency and lower energy consumption

# Contextualization

Co-extrusion is a breakthrough to prepare multilayer membranes in a single step

↓ production costs and favor the industrial application of membranes



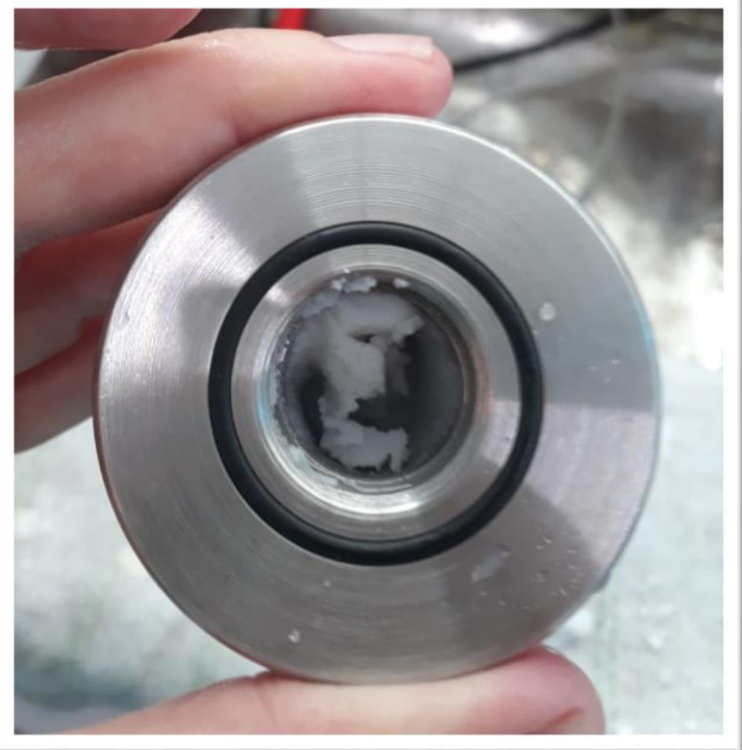
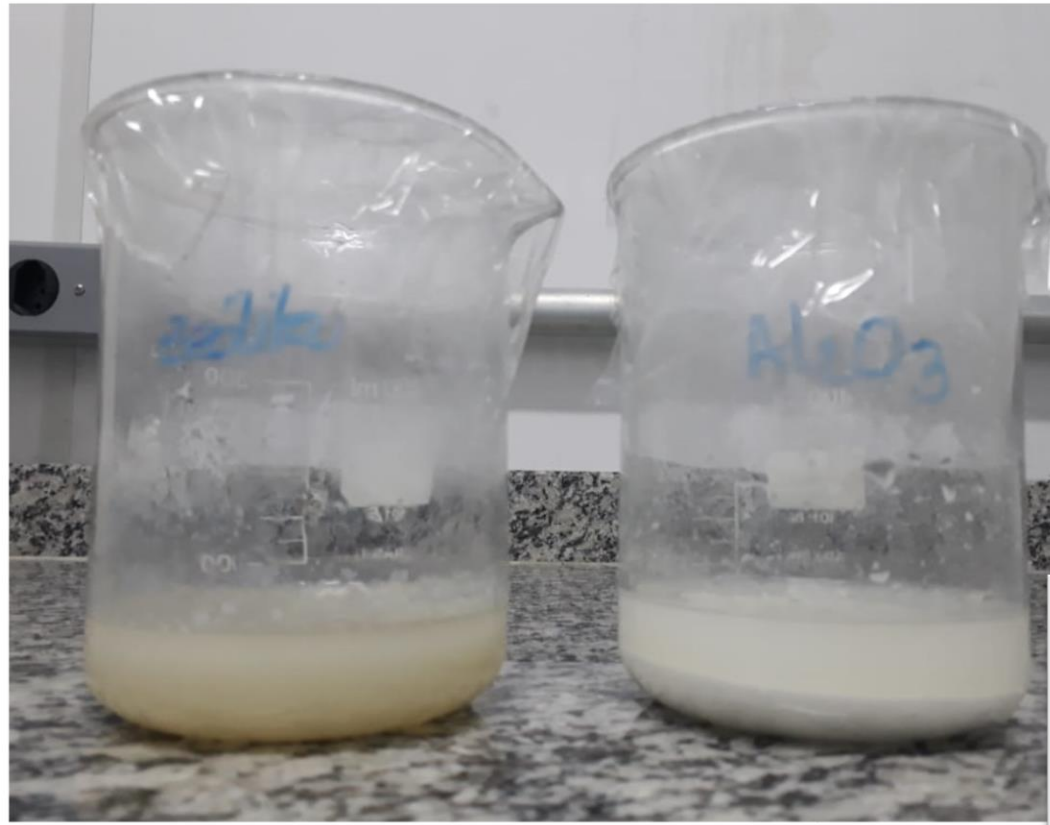
Scale bar : — 200 µm

(WIDJOJO et al., 2007)

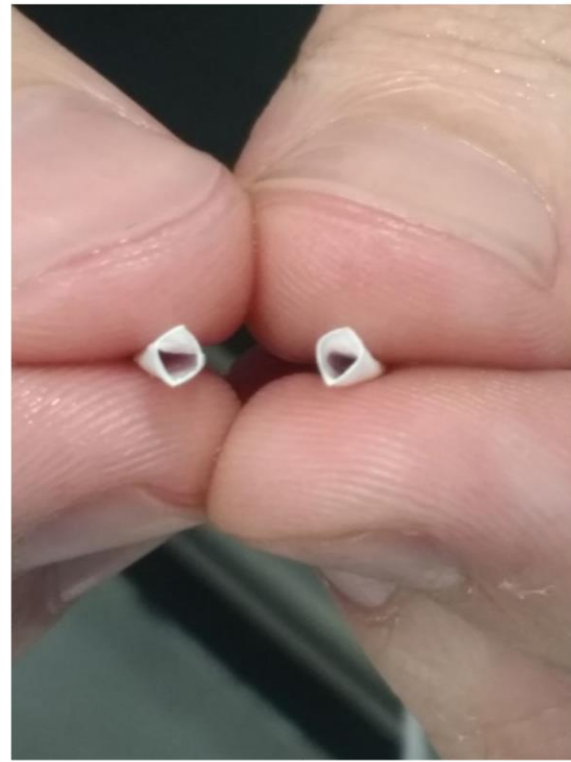
# Membrane Type and Fabrication Process

- Membrane: Double layer composite membrane;
- Separation mechanism: Molecular Sieve:
  - CO<sub>2</sub> kinetic diameter = 3.3 Å;
  - CH<sub>4</sub> kinetic diameter = 3.8 Å.
- Materials:
  - Zeolite 4A (active layer – Opening = 3.5 Å)
  - Aluminum Oxide or clay (support layer);
  - Polyethersulfone (binder);
  - N-Methyl-2-pyrrolidone (solvent).
- Fabrication processes:
  - Phase inversion by immersion precipitation;
  - Sintering.

# Results and Insights



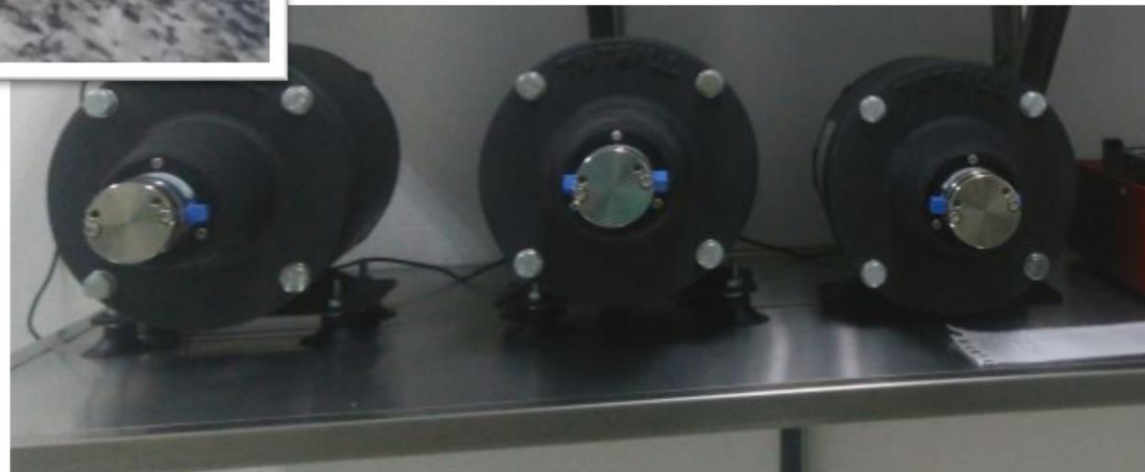
# Results and Insights





# Results and Insights

- syringe pumps malfunctioned  
went to maintenance – 18/06 but they have not returned yet.



# Waiting Equipment

- Calcination Oven
- Porosity by Physiosorption
- Zeta potential analyzer







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**THANK YOU**



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