

Department of Chemistry

Sustainable Membrane Processes

REQUIMTE/CQFB – Biochemical and Process Engineering Group



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Ph D in Chemical Eng.
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Master in Chem. Eng.
Processes, FEUP
Graduation in Chem. Eng.
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Ph D students: 6
Articles: 50 h- index: 15
Book chapters: 4

Objectives

Development of new membrane materials

- Based in biopolymers (polyssacharides, chitin).
- Mixed matrix membranes with metal organic frameworks (MMMs-MOFs).
- Integrating ionic liquids.

Membrane processes development and monitoring

- Use of molecular probes for monitoring membrane processes.
- Use o membrane contactors for process intensification.

Methodology

The membranes will be characterized using different techniques, depending on the applications:

- Transparency and color;
- Internal and surface morphology
- Mechanical and thermal properties
- Antimicrobial activity
- Resistance to organic solvents and life-time
- Permeability to water, gases and aroma compounds.

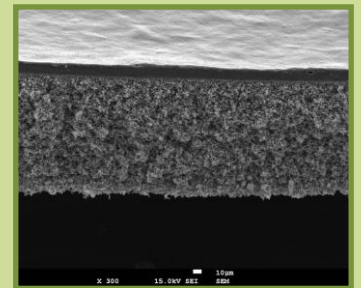
Expected Results

- Improvement and design of films and coatings for food applications.
- Solvent resistant membranes for pervaporation and nanofiltration processes.
- Mixed matrix membranes, with metal organic frameworks and task-specific ionic liquids for CO₂ capture from flue gas streams and biogas upgrading.
- Membranes with imprinted molecular probes for temperature and oxygen monitoring. Use in intelligent packaging and evaluation of thermal polarization in membrane processes.
- Membrane contactor/bioreactor for CO₂ removal from anesthetic gas circuits.

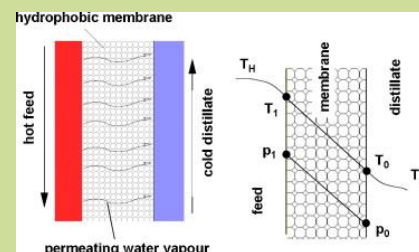
EPS Film



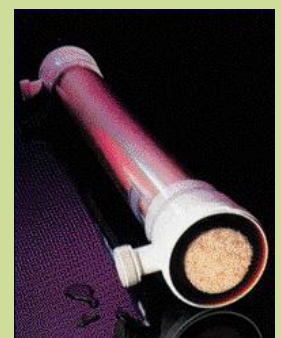
EPS-PES Membrane



Thermal polarization



Membrane contactor



Funding:

PTDC/AGR-ALI/114706/2009
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SusFoFlex FP7-KBBE-2011-5-CP-CSA, Proj. 289829
GLUECORK – QREN PROJECT IDT N° 23043 - 2013