

Chemistry Department

Membrane design and characterization

REQUIMTE/CQFB – Biochemical and Process Engineering Group



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(Post doc Reseacher, since 2010)

- Since 2013, Member of the Council of European Membrane Society
- 2010, PhD in Chemical Engineering
- 2004, Graduation in Chemical Engineering
- Total Articles: 15; Book Chapters: 1

Objectives

The main focus of the research is the design and characterization of novel membranes for different applications:

- 1) Efficient removal of CO₂ from anaesthetic gas circuits using liquid membranes with Task Specific Ionic Liquids (TSILs) and a very efficient enzyme, Carbonic Anhydrase;
- 2) CO₂ capture from flue gas in post-combustion processes at high temperatures using mixed matrix membranes with ionic liquids (MMMs-ILs);
- 3) Yeast Chitin-Glucan Complex Films using Biocompatible Ionic Liquids for Biomedical Applications

Methodology

To pursue my research interests, different characterization techniques were selected to evaluate the potential of the membranes designed for a specific application:

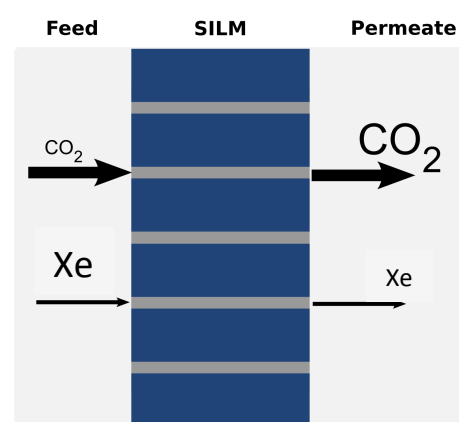
- Scanning electron microscopy (SEM); Thermogravimetric analysis; X-ray photoelectron spectroscopy (XPS); Mechanical Properties; Determination of gases solubility and diffusivity coefficients in ionic liquids; Pure and mixed gas gas permeability measurements (H₂, O₂, N₂, CH₄, CO₂ and Xe).

Expected Results

Regarding CO₂ capture from anaesthetic gas circuits it is expected to develop an innovative process which combines the properties of an efficient biocatalyst and the affinity of new ionic liquids for CO₂ capture, integrated in a membrane contactor, and to have a prototype ready to be installed and tested at an hospital.

An optimized protocol for the preparation of mixed matrix membranes, with the polymeric matrix, metal organic framework and the task-specific ionic liquid selected will be developed.

Wound dressing materials based on yeast chitin-glucans complex polymer.



- Polymeric porous support
- Pores filled with IL + CA



MMMs-ILs



Chitin-glucans complex membrane

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