DEVELOPMENT OF FLAT MEMBRANE MICROSTRUCTURES

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DESCRIPTION

Overview:

The purpose of the project is the preparation and characterization of flat polysulfone micromembranes, which could be applied for enantiomer separation of chiral compounds.

Background and State of the Art:

Membrane systems have been gaining importance during the last years as enantioseparation techniques, as they offer several advantages over traditional separation methods such as, its relative low cost, simplicity of setup and operation and the possibility to be used in continuous mode. Besides, they are environmentally friendly methods. Another interesting feature of membranes is that they allow the incorporation of specific and/or selective compounds, such as biomolecules, enzymes, etc, providing them with unique characteristics for selective separation, molecular recognition, process intensification, or the ability to respond and adapt to external stimuli. However, membranes also present some problems to overcome. The main drawbacks are: the need for a large area of membrane to achieve acceptable enantioselectivities, and energy consumption costs associated with cleaning and repair of membranes.
Membrane microstructures can solve these problems as they involve lower reagent consumption, improved heat and mass transfer, higher reaction rates and a significant increase of the area/volume ratio. Therefore, they are considered essential for the development of chemical processes that seek to obtain high added value products, as it is the case of the fine chemical and pharmaceutical industries.

Project Contribution and Methodology:

This project will contribute to explore and gain experience on the potential of scaling down membrane processes to be applied in novel processes.

The project methodology involves three steps: synthesis of the polymeric micromembranes by phase inversion precipitation method; characterization of the polysulfone microstructures by various techniques: scanning electron microscopy (SEM), image treatment and Fourier transform infrared spectroscopy (FTIR); and application of the obtained micromembranes for the enantioseparation of model chiral compounds.

The ideal candidate:

The ideal candidate should have a B.Sc. or B. Eng. Degree and should be able to express him/herself in correct English.
Previous knowledge on membrane technology will be taken into account, but it is not compulsory.
In order to work in our research group motivation, team working and initiative are essential skills.

Finishing the project:

When finishing the project, the candidate will have acquired the fundamentals on membrane technology (preparation and characterization), an emergent methodology in most industrial fields, as well as, various related techniques such as electronic microscopy, or liquid chromatography.
Besides the candidate will have experienced working in a dynamic multidisciplinary international research group.

References:

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