DN-MSCA-Horizon Europe
Grant n°101119277

In the frame of the Doctoral Network MSCA Horizon Europe "ChimSep" dedicated to the integration of membrane separations (Organic solvent nanofiltration and membrane distillation) in fine chemistry, 13 PhD projects are funded for 36 months: 8 dealing with membrane science and 5 dealing with homogeneous catalysis.

See all the 13 projects at https://theses.doctorat-bretagneloire.fr/dn-chimsep

Title- PhD#12: Advanced process monitoring by on-line fluorescence and advanced mathematical modelling in membrane distillation applied to alkoxycarbonylation of methyl-10-undecenoate in methanol

Joint doctorate

Offer description

PhD#12 will study the membrane distillation (MD) advanced process monitoring & mathematical modelling using molecular probes that report their local environment by changing their fluorescence to local temperature or pH (reactive processes) applied to an alcoxycarbonylation reaction mixture in methanol.
At University NOVA Lisbon (Portugal, 22 months) he/she will select adequate molecular probes able to respond to local (at molecular level) changes of temperature and/or pH. These probes will be selected taking into consideration their quantum yield and their ability to be dispersed in the MD membrane, assuring an adequate loading. **PhD#12** will measure the temperature at a molecular scale allowing the mapping temperature gradients at the membrane surface and/or across the membrane, making possible to compare the experimental values obtained with theoretical mass and heat transfer models and validate them, which is of utmost importance to define the best operating conditions.
At University of Rennes (ISCR-CIP, France,12 months), **PhD#12** will achieved out line membrane characterisation by the mean of streaming current/potential measurement in methanol. Such experimental data will be used for the proposal and validation of transfer model based on pH local variation acquired at University NOVA Lisbon. He/she will have cross-feedback with **all the Membranologist PhDs** of the doctoral network dealing with transfer and particularly **PhD#1** working on the same reaction and **PhD#5 & PhD#13** working on MD, as well as with Chemist **PhD#4 & PhD#7** of the doctoral network working on alkoxycarbonylation reaction. Depending on the MD performances, fractionation processes will be suggested either based on single MD or hybrid process. The preparation of the PhD thesis and defence will be finalized at University NOVA Lisbon.

PhD#12 will spend 2 months at ***Firmus, France*** to acquire a better knowledge on membrane process design for industrial applications allowing to understand the feasibility of such probe implementation at industrial scale.

Keywords:

Membrane separation, membrane distillation, homogeneous catalysis, modelling, fluorescence, on-line monitoring

PhD starting date: 01/11/2023

Application deadline: 31/08/2023 (23:59:00, Paris)

https://theses.doctorat-bretagneloire.fr/dn-chimsep

Work location: Lisbon, Portugal (two years) & Rennes, France (one year)

The Doctoral Candidate will be enrolled in a joint doctorate between two partners of the network. He/she will spend 20 months with the hosting partner (NOVA University, Lisbon, Portugal) of the present application and then a mobility of 12 months at University of Rennes, France.
During the doctoral period, the PhD will also spend 2 months ***Firmus, France*** to acquire a better knowledge on membrane process design for industrial applications

Contacts

Thesis main supervisor (Portugal)
Joao Crespo
jgc@fct.unl.pt
https://www.dq.fct.unl.pt/pessoas/docentes/joao-paulo-serejo-goul

Thesis second supervisor (France)
Anthony Szymczyk
anthony.szymczyk@univ-rennes.fr
https://iscr.univ-rennes.fr/
https://iscr.univ-rennes.fr/chemistry-and-process-engineering-cip

Required Education Level : Master degree or equivalent

Skills/Qualifications

The candidate will hold a Master degree or equivalent in chemical engineering or in chemistry with competencies in processes and/or membrane processes and/or fluorescence
A previous experience in handling membrane processes will be appreciated as well as knowledge in membrane material science.
Knowledge of analytical characterization techniques, in particular fluorescence will be appreciated
Enthusiasm, autonomy, scientific curiosity and ability to communicate are required qualities.

Required Language: English, level: Good

Required research experience

An internship of several months in a research laboratory involved in membrane separation and/or fluorescence will be appreciated

Website for additional job details;

See application platform: https://theses.doctorat-bretagneloire.fr/dn-chimsep
section “Présentation de l’école doctorale » (doctoral network presentation)

Salary

The EU provides support for each recruited researcher in the form of

- Gross salary per month: close to 2 002 € (net should be around 1 593 €)
- + 600 € of mobility allowance. All eligible researchers recruited within a DN are entitled to receive this allowance. It contributes to the private mobility related expenses of the researcher.
- + 495 € of family allowance per month (if eligible to the conditions: be married or equivalent and/or have a child; family, long-term leave and special needs allowances. The family status of a researcher will be determined at the date of their (first) recruitment in the action and will not evolve during the action lifetime.