



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-bretagne.fr/dn-chimsep>

### **Title- ChimSep-PhD#11: Catalyst recycling with functionalized ceramic membranes.** **Joint doctorate**

#### Offer description

**PhD#11** will experimentally study the integration of membranes (organic solvent nanofiltration and pervaporation) in different catalysed reactions with hybrid membranes and compare results to commercial polymeric membrane performances.

At VITO (22 months), he/she will study the effect of changes to the surface polarity, via modification with organic functional groups, of ceramic membranes on primarily separation performance but also reaction performance. This will include the effect of the membrane modification on catalyst recyclability and stability.

To achieve this, he/she will integrate the hybrid membranes into reaction processes to allow separation of reaction products from catalysts but also where possible the recycling of active catalytic species in the selected reactions. Cross-feedback with **all the Chemist PhDs** of the Doctoral Network involved in catalysis covering the selected set of reactions will be a requirement.

At University of Rennes (France, 12 months), **PhD# 11** will study organic solvent nanofiltration (OSN) in toluene with alternative polymeric membranes.

Feedback with Membranologist **PhD#1** of the Doctoral Network working on alcoxycarbonylation with the hybrid membranes and **PhD#9 & PhD#10** working on OSN of hydroformylation & hydrogenation Reactions with polymer membranes will be useful for a better understanding of limitation due to OSN and/or reaction specificity.

He/she will have discussion with **all the Membranologist PhDs** of the Doctoral Network dealing with OSN transfer and the 4 PhDs dealing with cascades.

The preparation of the PhD thesis will be finalized at VITO and defence at KU Leuven.

**PhD#11** will spend 2 months at **Boccard** to acquire a better knowledge on process design for industrial applications.

#### Keywords:

Membrane separation, organic solvent nanofiltration, homogeneous catalysis, functionalized ceramic membranes, pervaporation

PhD starting date: 01/11/2023

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

<https://theses.doctorat-bretagne.fr/dn-chimsep>

Work location: VITO, Belgium (two year) & Rennes, France (one year)

The Doctoral Candidate will be enrolled in a joint doctorate between two partners of the network. He/she will spend 22 months with the hosting partner (VITO, Mol, Belgium) 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 at Boccard, France working on process design for industrial applications.

## Contacts

Thesis main supervisors (Belgium)

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Thesis second supervisors (France)

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<https://iscr.univ-rennes.fr/chemistry-and-process-engineering-cip>

Required Education Level : Master degree or equivalent

## Skills/Qualifications

The candidate recently received your master grade in chemistry or chemical engineering with distinction

The candidate have an affinity/interest in organic synthesis and purification steps of the synthesized products and is really hands-on, performing his/her tests in the lab.

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 UV spectrometry and gas chromatography, 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 will be appreciated

## Website for additional job details;

See application platform: <https://theses.doctorat-bretagne.fr/dn-chimsep>

section "Présentation de l'école doctorale » (doctoral network presentation)

## Salary

The selected PhD-candidate will be assigned full-time with a PhD scholarship with full social security.

The EU Researcher Allowances (living, mobility and if applicable family allowance) will be used to cover both the employee's as the employer's mandatory charges.'

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

- Gross salary per month: around 2 375 € (net should be around 1 890 €)
- + 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