

Position Description

1. General Information

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| Name of the position | Mining of raw materials from sea water and industrial brines as an approach based on the blue economy to promote process industries decarbonization |
| Foreseen enrolment date | September 2025 |
| Position is funded by | <ul style="list-style-type: none"> • COFUND, Marie Skłodowska-Curie Actions (MSCA), Horizon Europe, European Union • Universitat Politècnica de Catalunya (UPC) • RMIT University |
| Research Host | Universitat Politècnica de Catalunya (UPC) |
| PhD awarding institutions | Universitat Politècnica de Catalunya (UPC) & RMIT University |
| Locations | Primary: Barcelona, Spain Secondary: Melbourne, Australia |
| Salary | 26,626.09 EUR annual gross salary (2,218.84 EUR monthly gross salary) |
| Supervisors | <ul style="list-style-type: none"> • José Luis Cortina, Professor, UPC • Julio Lopez Rodriguez, Lecturer, UPC • Jega Jegatheesan, Professor, RMIT University • Abhijit Date, Professor, RMIT University • Industry Partners: CETAQUA & Radical Innovations Group (RIG) |
| Group of discipline | Circular Process Engineering, Chemical Engineering, Raw Materials Engineering |

2. Research topics (only one of these projects will be funded)

Project 1: Production of sodium chloride from sea brines: an approach based on the blue economy to promote process industries decarbonization

Process industries are energy and material intensive facing the problem of reaching decarbonization scenarios, where in-situ chemical production and the integration of renewable energies are potential solutions. Industries located in coastal areas of arid and semiarid regions, as Europe and Australia, are suffering access to fresh water due to the intense water scarcity scenarios. Under this scenario, the sea is presented as a blue economy solution as it could provide access to fresh water to produce green hydrogen by using advanced membrane-based technology process. At the same time, a sustainable and circular processing approach could be integrated to recover valuable chemicals, such as sodium chloride for the production of chlorine, sodium hydroxide and hydrochloric acid. The PhD thesis will evaluate the techno-economic feasibility of developing a circular processing approach based on the use of pressure-driven membrane processes (RO, HPRO, UHPRO, OARO, LSRRO, NF and HPNF).



Supervisors: Jose Luis Cortina (UPC), Julio Lopez Rodriguez (UPC), Jega Jegatheesan (RMIT), Abhijit Date (RMIT)

Research Fields: Blue Economy, Decarbonization, Circularity

Project 2: Production of raw and critical materials from sea brines: and approach based in the blue economy to promote process industries decarbonization

Process industries are energy and material intensive facing the problem of reaching decarbonization scenarios, where in-situ chemical production and the integration of renewable energies are potential solutions. Industries located in coastal areas of arid and semiarid regions, as Europe and Australia, are suffering access to fresh water due to the strong water scarcity scenarios. Under this scenario, the sea is presented as a blue economy solution as it could provide access to fresh water to produce green hydrogen by using advanced membrane-based technology processes. Production of H₂(g) should be linked to the integration of renewable energies, accordingly. At the same time, a sustainable and circular processing approach could be integrated to recover valuable chemicals, as sodium chloride for the production of chlorine, sodium hydroxide and hydrochloric acid, as well as other critical elements such as magnesium and boron. The PhD thesis will evaluate the techno-economic feasibility of developing a circular processing approach based on the integration of pressure (RO, HPRO, UHPRO, OARO, LSRRO, NF and HPNF) and electrochemical (ED, EDBP) driven membranes technologies, ion-exchange, reactive precipitation and crystallization to demonstrate the on-site production of chemicals.

Supervisors: Jose Luis Cortina (UPC), Julio Lopez Rodriguez (UPC), Jega Jegatheesan (RMIT), Abhijit Date (RMIT)

Research Fields: Raw Materials, Blue Economy, Decarbonization

Project 3: Production of raw-materials from industrial brines: and approach based in circularity to promote process industries decarbonization

Process industries are energy and material intensive, facing the problem of reaching decarbonization scenarios where in-situ chemical production and the integration of renewable energies are potential solutions. Industries located in coastal areas of arid and semiarid regions, as Europe and Australia, are suffering access to fresh water due to the intense water scarcity scenarios. Under this scenario, process industry brines could provide access to fresh water to produce green hydrogen by using advanced membrane processes. At the same time, a sustainable and circular processing approach could be integrated to recover valuable chemicals, such as sodium chloride for the production of chlorine, sodium hydroxide, sulphuric acid and hydrochloric acid, as well as other critical elements, as magnesium, phosphate ammonia and nitrate. The PhD thesis will evaluate the techno-economic feasibility of developing a circular processing approach based on the integration of pressure (RO, HPRO, UHPRO, OARO, LSRRO, NF and HPNF) and electrochemical (ED, EDBP) driven membranes technologies, ion-exchange, reactive precipitation and crystallization to demonstrate the on-site chemical productions.

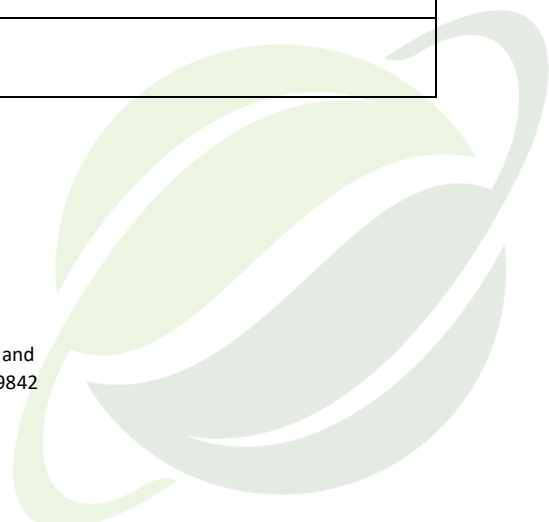
Supervisors: Jose Luis Cortina (UPC), Julio Lopez Rodriguez (UPC), Jega Jegatheesan (RMIT), Abhijit Date (RMIT)

Research Fields: Raw Materials, Blue Economy, Decarbonization

3. Employment Benefits and Conditions



This project has received funding from the European Union's Horizon Europe research and innovation programme under the Marie Skłodowska-Curie grant agreement N° 101179842



Universitat Politècnica de Catalunya (UPC) offers a 48-month full time work contract. The total working hours per week is 37.5.

The remuneration, in line with the European Commission rules for Marie Skłodowska-Curie grant holders, will consist of a **gross annual salary** of yearly 26,626.09 EUR (which is of monthly 2,218.84 EUR). Of this amount, the estimated net salary to be perceived by the Researcher is 1,819.00 EUR per month. However, the definite amount to be received by the Researcher is subject to national tax legislation and the personal situation.

Benefits include

- Becoming a Marie Skłodowska-Curie fellow and be invited to join the Marie Curie Alumni Association
- Access to all the necessary facilities at UPC and RMIT University
- Tuition fees exemption at both PhD awarding institutions
- Travel allowance to cover flights and accommodation for participating in DREAM+PLAN events
- Up to 12 months in Australia
- 22 days paid holiday leave
- Social security coverage
- Sick leave
- Parental leave

4. PhD enrolment

Successful candidates for this position will be enrolled by the following institutions and must comply with their specific entry requirements, in addition to DREAM+PLAN's conditions.

Universitat Politècnica de Catalunya (UPC)

To enrol in a Doctorate program you must meet the general conditions, namely:

As a rule, applicants seeking admission to an official doctoral programme must hold a Spanish bachelor's degree or equivalent and a Spanish master's degree or equivalent, provided they have passed at least 300 ECTS credits on the two degrees. Any of the following applicants may also gain admission:

- Holders of official Spanish degrees or equivalent Spanish qualifications, provided they have passed 300 ECTS credits in total and they can prove they have reached Level 3 in the Spanish Qualifications Framework for Higher Education.
- Holders of degrees awarded in foreign education systems in the European Higher Education Area (EHEA), which do not require homologation, who can prove that they have reached Level 7 in the Spanish Qualifications Framework for Higher Education, provided the degree makes the holder eligible for admission to doctoral studies in the country in which it was awarded.



Admission on this basis does not imply homologation of the foreign degree or its recognition for any purpose other than admission to doctoral studies.

- Holders of degrees awarded in a country that does not belong to the European Higher Education Area, which do not require homologation, on the condition that the University is able to verify that the degree is of a level equivalent to that of official university master's degrees in Spain and that it makes the graduate eligible for admission to doctoral studies in the country in which it was awarded. Admission on this basis does not imply homologation of the foreign degree or its recognition for any purpose other than admission to doctoral studies.
- Holders of another doctoral degree.
- University graduates who, having previously been awarded a training post in the entrance examination for specialised health training posts, have passed and obtained a positive assessment in at least two years of training on a programme leading to an official qualification in a Health Sciences specialisation.

Specific requirements and admission procedure:

Each doctoral programme may have specific requirements for admission in addition to the general requirements. The additional specific requirements that must be met for admission are listed on the web pages for each programme.

More information: https://doctorat.upc.edu/en/future-doctoral-candidates/access-and-admission/general-entrance-requirements?set_language=en

RMIT University

Visit the website: <https://www.rmit.edu.au/research/research-degrees/how-to-apply>

