Thèse CIFRE - PhD – Architectured polymer for Ion-Exchange Membrane (F/H)

Context

The position will be located in Marseille, France, in the Institut de Chimie Radicalaire (Université Aix-Marseille, CNRS, UMR7273). Part of the time (4 to 6 months) will be spent in the Center of Technologies of Michelin, Clermont-Ferrand, France.

The project tackles the design of disruptive polymers for ion exchange membrane, that could be used for several electrochemical membrane applications, such fuel cell, electrolyzer… The proposal is strongly in line with the policy of hydrogen materials and mobility development of the industrial partner and its ambitions. More information https://www.michelin.com/hydrogene/

Mission

In order to design high performance polymers, the aim is to :

- Design new organic building block
- Synthesize and characterize well-defined structure of architecture functional copolymer. The use of ROMP polymerization technique will be particularly emphasized
- prepare thin films with these polymers
- Evaluate structure and properties of such membranes

Activities performed by the student will comprise

- Organic Synthesis and Polymerizations techniques (controlled radical polymerization)
- Polymer chemistry
- Membrane characterization (structural, morphologies) and related properties

The candidate will have the opportunity to develop different skills and techniques:

- Regarding technical learning, the PhD candidate will have the chance to gain knowledge and hands-on experience in various areas, such as polymer synthesis, characterization techniques, membrane fabrication and characterization. Specifically, he/she will learn the principles and methodologies of synthetic organic chemistry, as well as the various analytical tools and techniques used in characterizing polymers, such as NMR, FTIR, DSC, TGA, and GPC.
  Additionally, the candidate will develop expertise in the preparation of thin films by different techniques. Finally, he/she will learn about the principles and techniques of membrane fabrication and testing for electrochemical applications.
- Disseminating research findings is a critical aspect of any doctoral project. After a possible protection of the data via the filing of a patent, the selected candidate will be expected to present their research findings in various scientific conferences and publish their results in peer-reviewed scientific journals. This will allow him/her to communicate the research outcomes to a broader scientific community, receive feedback, and establish collaborations with other researchers.
- Furthermore, PhD candidate will have the opportunity to complete short internships at Michelin, allowing him/her to gain valuable industry experience and learn about the practical aspects of technology transfer from academia to industry. These internships will also provide the candidate

with the opportunity to network with professionals and establish connections that may be useful in their future careers.

Expected skills (at least three items)

- Master's degree or equivalent in chemistry, polymer and materials science.
- Cautious experimental work, handling of sensitive compounds.
- Strong knowledge and practical experience in polymer synthesis and characterization.
- Familiarity with analytical techniques such as NMR, DSC, SEM, FTIR, and SEC and the ability to interpret and analyze data obtained from these techniques.
- Good organizational and time management skills to meet project deadlines and deliverables.
- Proficiency in French and/ or English, both written and spoken, is essential.
- Autonomy, anticipation, proactive spirit, being a source of proposals.
- Teamwork skills.

Application

The applicant should provide a cover letter, a full CV (including the scientific production).

Contacts

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Michelin

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