

Post-doctoral position at the University of Liège – Belgium
in the field of process design for CO₂ re-use solutions

The Department of Chemical Engineering at the University of Liège is offering a post-doctoral position in the field of process design for CO₂ re-use technologies and in particular power-to-fuel solutions. This position implies process modeling and process systems engineering tasks, as well as experimental activities including pilot design, construction and operation for CO₂ hydrogenation reactions.

Research area:

Carbon-based materials are omnipresent in our society due to the diversity of their properties. In particular, carbon-based fuels display a huge volumetric energy density, making them ideal energy vectors for long-term energy storage and long-range transportation. Making these materials from fossil-based resources eventually leads to releasing fossil carbon to the atmosphere, increasing CO₂ levels. As an alternative, biomass and captured CO₂ are suitable resources for carbon-based materials, although requiring significant energy input.

The University of Liège has more than decade-long experience in CO₂ capture and re-use. In particular, it has developed a strong database of various CO₂ re-use models, including simulation models for the synthesis of fuels such as methanol or Fischer-Tropsch fuels from CO₂. In parallel to process design, our recent work also focuses on developing lab facilities for testing conventional and innovative catalysts, simulating process transient behaviors and optimizing heat management methods. Our approach is to offer technological support for making CO₂ re-use technologies happen at local and international levels.

Description of the tasks:

The selected post-doctoral researcher will be active in projects related to CO₂ re-use at the Department of Chemical Engineering. In particular, the successful candidate will develop activities with the following objectives:

- Process design for various CO₂ re-use technologies, with a focus on the synthesis of e-kerosene. This includes the study of the interactions between the different process steps (electrolysis, Fischer-Tropsch reaction, reverse water-gas shift reaction, hydrocracking...), both at steady-state and dynamic operating conditions.
- Experimental design, construction and operation of a pilot unit for CO₂ hydrogenation, including definition of safety guidelines, measurement and analytics, planning and follow-up of experimental campaigns.

Moreover, the position includes following aspects:

- Participation to project meetings, presentation of results at conferences, writing of scientific articles, interaction with industrial and academic partners
- Research management and support to the activities of a group of about 10 international PhD students active in CO₂ capture and re-use
- Teaching duties are not part of the position, but post-doctoral fellows are encouraged to take part to teaching activities based on their own experience, upon discussion with lecturers.

Candidate's profile:

Candidates must hold a PhD degree in Chemical Engineering or similar field (process, energy, electro-mechanical, environmental engineering...). Experience in process design, simulation and optimization, either with flowsheeting tools such as AspenOne software (or similar) and/or numerical programming (Python, Matlab...) is required. Demonstrated experience in laboratory work, including design and construction of lab set-up, measurement and analytics, planning of experiments, definition of safety guidelines is a clear asset.

Candidates should also evidence interest in project and research management. They must be able to work in autonomy and identify their own tasks in relation to the group's objectives. Ease of interaction with academic and industrial partners is welcome. Excellent communication in English (oral and written) is required. Knowledge of French is very much welcome but not mandatory.

Research environment:

The successful candidate will join a dynamic and growing team within the PEPs group of the Department of Chemical Engineering (DCE), under the supervision of Prof. Grégoire LEONARD. The DCE employs about 75 people mostly active in the fields of process engineering and materials sciences in an international-friendly environment. The DCE is also an active member of the FRITCO₂T platform (Federation of researchers in innovative technologies for CO₂ transformation) at ULiège, and a founding member of the CO₂ Value Europe Association. More information about the Department of Chemical Engineering: www.chemeng.uliege.be.

Recruitment process:

Applications containing your CV, a cover letter highlighting your skills with respect to the position, and possibly reference letter should be submitted by e-mail to secretary.chemeng@uliege.be with mention "Post-doc application CO₂ re-use". Application deadline is August 31, 2022. Candidates selected from this first round will be invited for an on-line interview. The successful candidate will receive a position for two years, with extension possible. The grant amount is in accordance with Belgian university standards.