

Post-doctoral fellowship

Post-combustion CO₂ Capture process by absorption-regeneration applied to the cement industry

Context:

Previous studies presented in the different reports of ECRA (European Cement Research Academy) highlighted that two CO₂ capture processes can be applied in a cement plant: post-combustion and oxy-fuel combustion.

In the context of the ECRA Chair « **From CO₂ to Energy: Carbon Capture in Cement Production and its Re-use** » at the Faculty of Engineering (FPMs) of UMONS, related to the study of CO₂ capture applied to cement industry and its conversion into valuable compounds such as methanol, the two CO₂ capture technologies are studied and can also be combined in an hybrid system with a partial oxy-fuel combustion (O₂ enrichment of the air used for the combustion) and a post-combustion CO₂ capture process by conventional absorption-regeneration.

Once the CO₂ captured, it must be purified (de-dust, de-SO_x, de-NO_x, etc.) before being reused for its conversion into a valuable compound.

Four PhD-theses are currently carried out in the framework of the ECRA Academic Chair, from CO₂ capture to CO₂ conversion, including both experimental works, simulations and life cycle assessment (LCA) studies.

The post-doc position is completely integrated in this framework.

Job description:

The post-doctoral position involves personal research activities:

As continuation of previous projects, it will be proposed to the post-doc to work on the optimization and improvement of the post-combustion CO₂ capture process by absorption-regeneration through Aspen Plus/Aspen Hysys simulations of :

- alternative process configurations (e.g. intercooled absorber, lean vapor compression, etc.);
- processes using different solvents (presenting alternative thermodynamics and kinetics characteristics);
- flue gas treatments for different CO₂ contents (conventional combustion or oxygen enriched combustion).

This implies regular technological watch in relation with CO₂ capture and purification, allowing to propose new relevant research areas, but can also include some experimental tests (absorption and/or regeneration) of different amine(s) based solvents.

The post-doctoral position will also include technical, scientific and communication supports to the ECRA Chair research activities.

Candidate's profile:

Education: Candidates must hold a **Master degree** (5-years duration) and a **PhD** degree, both in a thematic related to Chemical engineering/Chemistry or other fields (such as industrial chemistry, environmental engineering, etc.), with a strong interest in energy, process and/or environmental engineering and optimization. Any experience in relation with carbon capture, purification and/or utilization will be a valuable asset.

Languages: An excellent level of English is required, both oral and written; a knowledge of French would be an asset.

Specific skills: Candidates must have a significant experience with simulation and modeling tools such as Aspen Plus/Aspen Hysys, Matlab, etc..

Other skills: Writing skills, good interpersonal and communication skills, rigor, conciseness and motivation.

The candidate will be hosted in a nice working environment under a challenging job at a dynamic and ambitious University. Salaries are in accordance with the internal University agreement regarding post-doctoral fellowship (net salary: ~2300 €).

Applications (CV + publications/communications list + motivation letter showing the adequacy with the requested profile) should be sent to:

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ECRA Academic Chair

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The post-doctoral position (18 months) is expected to start between May and September 2017.