



Horizon 2020 - Research and Innovation Framework Programme

**Metal Organic Frameworks for carbon dioxide
Adsorption processes in power production and energy
Intensive industries**

**15 months post-doctoral position in Mons, Belgium
Starting : at beginning of 2020**

**“CO₂ Capture by Adsorption - Assessment of Metal Organic
Frameworks performances for VPSA process”**

Context:

Power generation and carbon-intensive industries are responsible for a large share of the anthropogenic CO₂ emissions to our atmosphere. Shifting towards a low-carbon economy needs cost-effective novel carbon capture solution (CCS) to be conceived, tested and deployed afterwards. Current solutions either suffer from high energy penalties like in amines-based absorption or simply cannot offer sufficient performances. **Adsorption process** is widely considered as a promising alternative for capture and concentration of CO₂ arising from large sources such as power plants and other energy intensive industries (e.g. cement, steel, iron, chemical or petrochemical industries). In this regard, **Metal Organic Frameworks (MOFs)** are a widely studied class of porous adsorbents that offer tremendous potential, owing to their large CO₂ adsorption capacity and high CO₂ affinity. However, the performances of these hybrid materials in carbon capture technologies have not been fully evaluated and fine-tuning is still needed for adsorption processes at large scale in real industrial conditions.

The **objective of MOF4AIR** is to **demonstrate the performances of MOF-based CO₂ capture technologies in power plants and energy intensive industries**. To that purpose, MOF4AIR will demonstrate in real conditions and on industrial sites, optimized MOF-based adsorbents with fine-tuned CO₂ adsorption processes through a multidisciplinary approach.

Area of the proposed research:

The proposed postdoc position will be focused on vacuum pressure swing adsorption (VPSA) process using MOFs, the work will include the following tasks:

- Modelling and simulations of VPSA processes (using Aspen Adsorption, g-PROMS or others simulation and optimization tools for adsorption units) to determine the global performances of the processes;
- VPSA experimental testing: Two of the selected shaped adsorbents will be tested in a lab-scale 2 or 3-column VPSA unit. The testing will give valuable

feedback to the modelling activities: model improvement, further optimization of the VPSA cycle that gives the highest process productivity while reaching both the target CO₂ capture rate and CO₂ purity of the product stream;

During the post-doc, several exchanges with internal collaborators (PhD students, other post-docs, etc.) or project's partners will be required. The recruited person will also be involved in the design and the construction of VPSA pilots in industrial sites (Norway, France, Turkey).

Candidate's profile:

Education: The candidates must hold a PhD in chemical/process engineering and be familiar with adsorption processes (PSA, VSA or TSA).

Strong background in processes and simulation/modelling tools (such as Aspen Adsorption, g-PROMS, Aspen plus, ...) is necessary.

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

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

The candidate will be hosted in a nice working environment under a challenging job in a dynamic and challenging European project. Salaries are in accordance with the internal University agreement (average 2200 net €/month).

Recruitment procedure:

Applications (CV + motivation letter showing the adequacy with the requested profile + eventual letters of recommendation) must be sent by email before the 31th December 2019 to:

Prof. Guy DE WEIRELD: guy.deweireld@umons.ac.be ;

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