CIFRE PhD Position

Thermochemical Response of Sorptive Materials
Dynamic humid atmospheres, thermal signatures, ageing and regeneration

Topic	Thermodynamics, kinetics, heat release, thermal transport, ageing and regeneration of porous sorptive materials exposed to water vapour and trace compounds
Host company	Savery
Academic laboratory	IRCELYON, CNRS UMR 5256, Université Claude Bernard Lyon 1
Funding	Industrial, 3-year salaried doctoral contract
Location	Lyon, France, with periods at the company
Expected start	October-December 2026
Working language	English or French

Research focus

A standalone doctoral programme linking adsorption thermodynamics and realistic-air durability to measurable thermal responses at material and component scale.

The challenge

Porous sorptive materials operate in atmospheres that change with time and contain several species. Water vapour usually dominates loading and heat release. Trace compounds can modify transport, selectivity, thermal response, drift and reversibility. The same coupled response can support an air-treatment function or provide a thermal signature of the surrounding atmosphere.

Current characterization is fragmented. Powder thermodynamics, coated-component behaviour, ageing and transient thermal response are often measured separately. A traceable relation from material state to useful function is therefore missing.

How can sorption under dynamic humid air be converted into a reproducible thermal response while preserving, recovering and qualifying material performance?

Scientific objective

The PhD will develop an experimental and predictive framework that links atmosphere, material history and component boundary conditions to five measurable outcomes:

- equilibrium uptake, differential sorption enthalpy and rate laws;
- transient heat release and heat- and mass-transfer limitations;
- selectivity, interference and repeatability in water-plus-trace-species atmospheres;
- reversible and irreversible change, including regeneration and recovery;
- thermal signatures at material, coating and component scale.

Why it matters

Sorption technologies can reduce the energy demand of dehumidification and air treatment, support water recovery, and provide useful thermal responses at component scale. Industrial use depends on reliable performance in humid, contaminated and changing atmospheres. This PhD connects fundamental measurements to the design, service and qualification decisions required for deployment.

Candidate profile

We seek an experimental candidate with strong foundations in one or more of the following areas:

- physical chemistry, adsorption, catalysis or materials science;
- mechanical, process, chemical, thermal, energy or environmental engineering;
- heat and mass transfer, calorimetry, thermal instrumentation or transient thermal characterization;
- data analysis, parameter estimation or uncertainty quantification for experiments.

The candidate must be rigorous, autonomous and comfortable with difficult experimental systems. Experience with sorption measurements, calorimetry, humid-gas handling, porous materials, coatings, thermal interfaces or test benches is useful. Strong scientific fundamentals can compensate for missing experience in one area.

Scientific and industrial environment

The thesis will be hosted at IRCELYON, a joint CNRS / Université Claude Bernard Lyon 1 research laboratory with expertise in catalysis, surfaces, functional materials, environmental chemistry and physicochemical characterization. The work will benefit from the scientific guidance of Prof. Aline Auroux and Prof. Georgeta Postole and from IRCELYON's facilities.

Savery Tech develops sorption-based thermal and air-treatment technologies. The company will connect the research to component design, realistic operating conditions, test benches, qualification and industrial decisions.

Career path

The thesis prepares the candidate for industrial or applied-research roles in materials and process research, experimental systems, product qualification, thermal integration, reliability and industrialization. Depending on the thesis results and company development, post-PhD integration will be considered.

How to apply

Please send:

- CV;
- short motivation letter;
- academic transcripts;
- names of one or two academic or industrial referees.

Contact: georgeta.postole@ircelyon.univ-lyon1.fr; frederic.cui@savery.tech

Applications will be reviewed on a rolling basis until the position is filled.