Offer of a one-year post-doc or contract research engineer position.

The Laboratoire de Mécanique des Solides is offering a one-year post-doc position or contract research engineer position in the field of thermal energy storage using thermochemical processes for applications in residential heating, as part of the energy transition.

The thermochemical process to be used was developed during a thesis. It is patented by the inventor, CNRS and Ecole Polytechnique. The reactive material is based on salt hydrates, whose hydration reaction is highly exothermic. The principle of the thermochemical battery is based on cycles of dehydration (battery charge) and rehydration (battery discharge). The thermochemical material developed is a composite: the reactive salt is incorporated into a matrix that ensures 1) thermomechanical resistance, 2) mass (water vapor) and heat exchange kinetics. Performance stability during charge/discharge cycles has been validated by calorimetric measurements under laboratory conditions on daily cycles.

The aim is now to develop an instrumented laboratory model, featuring two renewable energy-based charging systems: 1) forced hot air flow (simulating solar thermal air panels), 2) joule-effect heating (simulating photovoltaic panels). The work consists in 1) optimizing the reactive composite material and manufacturing a volume of a few liters, 2) developing the Lab-scale model with heating systems and measurement instrumentation, 3) carrying out tests under realistic conditions and charting the performance criteria.

The work will be carried out mainly at the Ecole Polytechnique Solid Mechanics Laboratory, with collaboration from the Ensta (Unité Chimie des Procédés).

The “pre-maturation” project is financed by the SATT (Société pour l'accélération du transfert technologique) de Saclay. The technology is currently at TRL3 stage. The project aims to develop it to TRL4 to 5. Depending on the results, this project may be followed by a “maturation” project, prior to transfer to industry.

The candidate should have a multidisciplinary profile, with a solid grounding in physics, chemistry, thermodynamics and electronics, as well as a taste for experimental set-up and physical measurements. A background in energetics is desirable.
Remuneration will depend on the candidate's experience, and will be determined according to CNRS salary scales. The contract can start as early as October or November 2024.
Applications should be sent to :

Mr Alexandre Dimanov

alexandre.dimanov@polytechnique.edu

Laboratoire de Mécanique des Solides
Ecole Polytechnique, Bât. 104
Route de Saclay, 91128 Palaiseau.