POST-DOC Project EIPHI GS TEDDHY

Job title	Consideration of decrepitation in discrete numerical element (DEM) simulation of the aging of a green storage hydride and its reservoir.
Job type (PhD, Post-doc, Engineer)	Post-Doc
Contract duration (months)	12 months
Qualifications (Master, Ph.D …)	Ph.D
Employer	UBFC Université Bourgogne Franche-Comté
Financing Institutions	Région Bourgogne Franche-Comté & Graduate School EIPHI
Host Laboratory	FEMTO-ST
URL Host Laboratory	https://www.femto-st.fr/fr
Address Host Laboratory	15B, avenue des montboucons 25000 BESANÇON
Job description	To model the thermo-mechanical behavior and aging of the confined storage medium during cycles, to predict the stresses in the tank, its damage or even its rupture, and finally to evaluate the technologically acceptable geometries. Indeed, there is a growing demand for complex geometries that can be integrated into existing systems (exploitation of dead volumes, or integration of innovative heat exchangers with complex shapes (e.g. lattice structure from additive manufacturing) that regulate the endo/exo thermal aspect of the reaction, to maximize the filling/emptying rates of the tank. Building on the work of the current thesis, which develops the basis of a model of respiration of the granular storage medium, the challenge of the post-doctoral fellowship is to enrich the DEM models to simulate the decay, and thus the evolution of the particle size, morphology and distribution. The goal is to reliably estimate the mechanical stresses induced on the tank or exchanger, even if tortuous, to predict damage or lifetime. Easy-to-use design tools will be developed. These advances towards high TRL will allow to develop industrial partnerships, in the 2nd phase of the PEPR "Decarbonated Hydrogen"/Plan France Relance, where solid storage appears via system integration. The results obtained, presented to the FRH2 community, and published internationally, will contribute to reinforce the positioning of the region as an active and competitive center of research on H2 storage in solid form.
Supervisor(s)	Anne MAYNADIER – Associate Professor at UBFC
Candidate profile	The numerical work of the post-doctoral fellow will allow the model to be enriched with decay, with the morphology of the particles, and thus to represent the segregation, the settlement and the intensification of the mechanical stresses during the cycles. Its role will be to go towards the simulation of complex geometries, to evaluate the feasibility of integrating tortuous heat exchangers. The serviceability of different geometries will be evaluated during this post-doctoral fellowship to provide industry with a sizing tool to move towards conformable tanks.
Keywords	Hydrogen, hydruration, decrepitation, modelling
Application deadline	31st May 2022
Application Depending on the type of position	Please send the following documents (all in one PDF file) by e-mail to anne.maynadier@femto-st.fr :

	1) For EU candidates: Copy of your national ID card or of your passport page where your photo is printed. For non-EU candidates: Copy of your passport page where your photo is printed. 2) Curriculum Vitae (may include hyperlinks to your ResearchID, Research Gate, Google Scholar accounts). 3) Detailed list of publications (may include hyperlinks to DOI of publications). 4) Letter of motivation relatively to the position (Cover Letter) (maximum 1 page) 5) Copy of your PhD degree if already available. 6) Coordinates of reference persons (maximum 3): Title, Name, organization, e-mail. If you have questions regarding the application, you can contact the supervisor.