

## One-year post-doctoral contract (M/F) “Study of the H<sub>2</sub> potential of the North American intracratonic zone”

As part of the ExploH<sub>2</sub> research project, funded by Carnot ISIFoR and Carnot IFPEN Ressources Énergétiques, and coordinated by 2 structures, DMEX UAR 3360 at the University of Pau and Pays de l'Adour (Pau) and IFP Energies Nouvelles (Rueil- Malmaison and Lyon), we offer a one-year post-doctoral contract.

### Research project:

The ExploH<sub>2</sub> project aims to propose a method for quantifying natural hydrogen emitted in a continental environment. The global production of natural H<sub>2</sub> is probably largely underestimated at present, which represents a major obstacle to the development of this energy source. It is therefore urgent to propose more accurate estimates. The ExploH<sub>2</sub> project aims to study samples taken during a sampling campaign of rocks belonging to the North American Precambrian basement (thesis V. Combaudon, 2023). The multimodal and multi-scale characterization methodology developed at the DMEX Centre for X-ray Imaging will be used and optimized (Kularatne et al., under revision by International Journal of Hydrogen Energy; thesis V. Combaudon, 2023) and supplemented by a hydrogen production estimation protocol. This methodology is innovative because it makes it possible to study heterogeneous natural samples of centimeter size, in three dimensions and in a non-destructive manner thanks to the use of an X-ray tomograph (micro-CT) equipped with a spectral detector (spectral-CT). It will be supplemented by analyses obtained by scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS) and microprobe. The coupling of all these data will make it possible to identify and quantify the volume of secondary mineral phases rich in iron 3+, formed following an oxidation-reduction reaction. It will then become possible to estimate the volume of H<sub>2</sub> generated per kg of rock.

Ultimately, the ExploH<sub>2</sub> project represents the opportunity for the two Carnot institutes, through the DMEX Centre for X-ray Imaging and a collaboration with the Physics and Analysis Department of IFPEN, to position themselves as an academic leader in the characterization of source rocks in support of natural H<sub>2</sub> exploration.

### Qualifications required for the candidate:

PhD with knowledge in X-ray tomographic imaging, electron microscopy, microprobe, image analysis and geology.

Experience in the use of image analysis tools such as Dragonfly or Fiji and data analysis tools such as Matlab and Python would be a plus.

You are rigorous, curious, autonomous and interested in research. You demonstrate listening and communication skills to successfully carry out R&D projects. You are fluent in English and French.

### Location and supervision:

In Pau (France), at the X-ray Imaging Centre of the University of Pau and Pays de l'Adour (UAR3360, DMEX, <https://imagingcenter.univ-pau.fr/>) and with short trips at IFPEN (Lyon) (<https://www.ifpennergiesnouvelles.fr/>). The project will be supervised by Dr. Pascale Sénéchal (UPPA), Dr. Hannelore Derluyn (CNRS), Pr. Peter Moonen (UPPA) and Dr. Olivier Sissmann (IFPEN).

### Remuneration:

Around 3000 euros gross monthly.

### Desired period & application procedure:

From September 2024 for a period of 12 months. Applications will be studied until a candidate is selected.

Motivation letter and CV to be sent jointly to the following addresses, putting **ExploH<sub>2</sub> candidate** in the subject line:

[pascale.senechal@univ-pau.fr](mailto:pascale.senechal@univ-pau.fr); [hannelore.derluyn@univ-pau.fr](mailto:hannelore.derluyn@univ-pau.fr); [olivier.sissmann@ifpen.fr](mailto:olivier.sissmann@ifpen.fr)