Post-doctoral position in multi-modal Xray / FIB-SEM imaging

Starting date: ASAP
Contract duration: 12 months

Summary:

As part of our ambition of becoming a world-class player in the energy transition, the Imaging Centre of Excellence of TotalEnergies – OneTech develops advanced imaging technologies to characterize the structure and behaviour of various materials used within our energy mix, from rock samples to battery components to (bio)polymers, among others. In this context, we wish to recruit a post-doctoral associate to investigate, develop, and combine imaging technologies to facilitate the characterization of porous materials at multiple scales (from the nano- to the centi-meter scale). Imaging modalities available in-house include Xray Computed micro-Tomography (Xray-µCT) and Focused Ion Beam Scanning Electron Microscopy (FIB-SEM), while complementary imaging techniques may be investigated as part of a larger collaboration with external partners.

The successful candidate will undertake independent scientific/technical research into new and improved methods for imaging and cross-correlating Xray-µCT and FIB-SEM acquisitions, in a joint project between the Imaging Centre of Excellence at TotalEnergies and the DMEX platform at the University of Pau. He/she will tackle three main technical challenges: 1) improving the resolution and/or quality of Xray-µCT images using physical knowledge of the imaging system and/or the samples of interest; 2) design a common sample holder able to move from the Xray-µCT to FIB-SEM (and back) 3) define sample preparation protocols compatible with both imaging modalities, notably permitting a successful spatial correlation between acquisitions. The materials of interest currently include rock and battery samples, although this list may expand to new areas of interest to the group.

This position is based in Pau, France, and is shared between the Jean Féger Scientific & Technical Centre (CSTJF, TotalEnergies) and the UPPA campus, where the devices are located.

Location:

- UPPA, Pau, France (https://www.univ-pau.fr/en/home.html)
- CSTJF, Pau, France (https://cstjf-pau.totalenergies.fr/en)

Required profile:

- PhD in Material of Life Sciences with significant hands-on experience in Xray or electron (notably FIB-SEM) imaging techniques.
- We will favour candidates with prior experience in geosciences, battery technologies, or polymers, however we encourage candidates with strong imaging-related experimental skills in other areas to apply.
- Knowledge of associated image processing methods and software is a plus, but not required.

Supervisors & contact:

- Dr. Alexandre Dufour, Imaging Centre of Excellence, TotalEnergies (alexandre.dufour@totalenergies.com)
- Isabelle Jolivet, Imaging Centre of Excellence, TotalEnergies (isabelle-c.jolivet@totalenergies.com)
- Dr. Peter Moonen, DMEX platform, University of Pau (peter.moonen@univ-pau.fr)

References:

- Goral et al., (2016) Correlative X-ray and Electron Microscopy for Multi-scale Characterization of Heterogeneous Shale Reservoir Pore Systems, *AAPG Memoir 112*.
- Gelb et al., (2017) Multi-scale 3D investigations of a commercial 18650 Li-ion battery with correlative electron- and X-ray microscopy, *Journal of Power Sources 357.*
- White et al., (2019) Correlative X-ray Tomographic Imaging of Catalyst Layer Degradation in Fuel Cells, *Journal of the Electrochemical Society 166*.
- Lutter et al., (2021) Combining X-ray Nano Tomography with focused ion beam serial section imaging—Application of correlative tomography to integrated circuits, *Nuclear Instruments and Methods in Physics Research B*