1-year post-doctoral position available at CEA-Leti and LTM laboratory in Grenoble

"Deep learning for 3D segmentation of nanocomposite materials at the nanoscale"

In the context of a joint project funded by the MINOS LabEx, the CEA-Leti and the LTM laboratory are seeking a candidate for a 1-year postdoctoral position, in the topic of deep learning applied to the segmentation of nanocomposite materials imaged by FIB-SEM tomography. The starting date with ideally be March/April 2021.

Research topic:

LTM and CEA-Leti work jointly on the integration of nanocomposites in microelectronic devices. The 3D characterization of these materials by FIB-SEM tomography is essential to optimize their fabrication and to increase their final performance. FIB-SEM tomography generates very large volumes of data (ranging from 10Gb to more than 100Gb per analysis) which are often manually segmented for the extraction of quantitative information such as the size of nanoparticles and their 3D distribution within the polymer.

Rapid advances in the field of artificial intelligence, in particular deep learning, are now making it possible to automate the processing of such data. We propose here to explore these tools, not only to obtain fast and reliable results with very little human intervention, but also to allow comparative and objective studies on different types of nanocomposites.

The candidate will first pre-process and annotate synthetic data or a subvolume from the FIB-SEM data using Ilastik software. He/she will then train different 3D architectures of convolutional neural networks (CNN) implemented at the LTM laboratory, and apply them for the automatic segmentation of large experimental data. The different approaches will be compared in terms of segmentation quality vs. training time. Once this analysis pipeline has been validated, the candidate will use it to carry out comparative studies on different types of nanocomposites (different particle sizes, different compositions, different coatings) using the same training database.

Research field: deep learning, semantic segmentation, 3D nanocharacterization, FIB-SEM.

Profile: Eligible qualifications for this position include:
- PhD in Physics/Applied Maths/Materials Science with a strong background in image analysis;
- Proficiency in Python;
- Experience in GPU and deep learning frameworks such as Keras, Tensorflow and Pytorch;
- Excellent written and verbal communication skills in English;

Applications deadline: February 5th, 2021. Please send a CV, a short cover letter and contact details of two referees to: Zineb Saghi (zineb.saghi@cea.fr), Sébastien Soulan (sebastien.soulan@univ-grenoble-alpes.fr) and Patrick Quéméré (Patrick.quéméré@cea.fr).