Post Doctoral Fellowship: Beamline ROCK

SOLEIL, which is located near Paris on the Plateau of Saclay, is a particle accelerator producing synchrotron radiation, an extremely powerful light source shared by 29 beamlines and covering the energy range from the far IR to the hard X-ray. It opens to a large scientific and industrial users community in a very broad range of research fields from life to material science. This multidisciplinary tool welcomes more than 3,000 users per year and runs continuously 24 hours a day, 7 days a week, with uninterrupted periods of up to 7 weeks. Financed by two principal shareholders- the CNRS and the CEA- SOLEIL holds a status of "Public Company".

The Synchrotron SOLEIL opens a 16 months postdoctoral position at the ROCK beamline. ROCK is a dedicated Quick-EXAFS beamline working in the 4-40 keV energy and sub-second time resolution for collection of a XAFS spectrum. The beamline, in operation since 2015, has been funded by the French program "Investissements d'Avenir" to contribute to the development of more efficient catalysts and batteries which should find successful industrial applications in the field of energy generation and storage in compliance with the protection of public health and environment. Recently, hyperspectral quick-XAFS full-field imaging has been developed at the beamline offering micron-meter spatial resolution together with second time resolution for efficient monitoring of reaction kinetics.

This 12-months postdoctoral position is funded by the French National Research Agency (ANR) within the collaborative ANR MULTIPROBE project between different research teams with complementary expertise in spectroscopy techniques: X-ray absorption spectroscopy (SOLEIL Synchrotron), environmental electron microscopy and electron energy loss spectroscopy (IPCMS, Strasbourg) and catalysis (UCCS, Lille). The postdoctoral fellow hosted at SOLEIL will be involved in the *operando* XAS and hyperspectral imaging experiments carried out on catalytic systems studied within the MULTIPROBE ANR project, the development of tools and methods for an efficient data collection and multivariate data analysis of hyperspectral XAS but also EELS/EDX data, as well as their correlative analysis with operando TEM.

I.MISSION

The postdoc will work at the ROCK beamline with the following tasks:

- Optimize data acquisition strategy taking into account the noise contained in XAS or EELS images for efficiently extract the information contained in the hyperspectral imaging cube by spectral unmixing multivariate algorithms.
- Implement in Jupyter notebooks, skills already used at the beamline for the multivariate data analysis of non-spatially resolved XAS data (PCA, MCR-ALS).
- Participate to the hyperspectral experiment campaign at the ROCK devoted to the study of activation and reactivity of catalysts used for hydrogenation of

CO or CO_2. Modulation Excitation Spectroscopy for unravelling active species will be applied during pulses of reactive gases.

Machine Learning methods will be applied under the supervision of the GRADES group at SOLEIL.

II. Experience required

The candidate must hold a PhD. Experience with object-oriented programming support is required. A research experience in the field of X-ray and/or electron microscopies would be recommended.

Moreover, the following expertise will be considered with particular attention:
- Teamwork skills
- Knowledge of French is not mandatory, but a fluent level of spoken and written English is required.

III. General condition

The contract is for one year.

All applications must include:
- Curriculum vitae
- List of publications
- Motivation letter
- Two referees.

Candidatures should be addressed by e-mail to Valérie Briois (briois@synchrotron-soleil.fr)