



CEA-Grenoble/IRIG is seeking to recruit a:

Post-Doctoral Fellow (f/m): Bragg coherent diffraction imaging during *in situ* catalytic reactions

The Subject

The postdoctoral research project is part of an ANR-funded project called DINACS (*Defects in Nanocrystals: Coherent Diffraction Imaging and Simulations*) and an ERC-funded project called CARINE (*Coherent diffrAction foR a Look Inside NanostructurEs towards atomic resolution: catalysis and interfaces* – <https://carine-erc.eu>) to apply new coherent diffraction imaging (CDI) capabilities to probe nanostructures with extended defects. The main objective of the project is to image nanostructures *in situ* during reaction and to reveal their structure evolution in time and at the nanoscale to probe bulk, surface and interface effects, as well as defects. Catalysts play a key role in approximately 90% of industrial chemical processes. The development of heterogeneous catalysis with selectivity targeting the 100% is a constant challenge as well as understanding the durability and ageing of the catalyst itself. However, the catalytic process and the associated structural changes still remain poorly understood. The influence of extended defects (dislocations, stacking faults, twins) inside single metallic nano-objects will be monitored *in situ* and *operando* during catalytic reactions using both Bragg coherent diffraction imaging and Bragg ptychography.

The Function

The successful candidate will develop Bragg coherent diffraction imaging and Bragg ptychography to study *in situ* and *operando* the structural evolution of highly strained catalytic nanoparticles in various gaseous and liquid environments during reaction. He/she will participate in the experiments, will perform the data treatment using the so-called phase retrieval algorithms. The work will be performed in close collaboration with the ID01 beamline of The European Synchrotron (ESRF), a world-leading x-ray facility, with a revolutionary new storage ring that increases the brilliance and coherence of x-rays by a factor of 100 compared to present-day light sources. The project also includes a collaboration with the IM2NP laboratory in Marseilles.

Profile of The Applicant

The applicant should hold a PhD in physics, chemistry or material science or closely related science. Previous experience of synchrotron x-ray diffraction (as well as atomistic simulations) will be an advantage. The applicant should have very good skills in programming (Python). He/she should have good interpersonal, communication, organisational and presentational skills. The working language is English.

Contract Characteristics

This is an **18-month** contract located at Grenoble (ESRF).

Interested applicants should submit:

- (1) 1-page cover letter stating the motivation, research experience and goals, and anticipated available date;
- (2) curriculum vitae, and
- (3) contact information for 2 references (reference letters are not required at this time) to Marie-Ingrid Richard (mrichard@esrf.fr) by 20th April 2024.