

Post-doctoral Position - ODE

Division Expériences

Position opens in October 2009. Deadline for submission of application: **November 15th**

Established at Saint-Aubin in south of Paris, SOLEIL is a new optimized 2.75 GeV synchrotron light source, which hosts facilities providing cutting edge activities in all fields of science and industrial research. The storage ring of 354 m in circumference supplies already highly brilliant light. The 11 first beamlines are now open to users. The other 15 beamlines are presently under construction. SOLEIL is a major national installation with a permanent staff of 357 people operates as a facility allowing the access to any scientist around the world on a peer review proposal system. The exceptional characteristics of SOLEIL in operating energy, number of undulators, wide spectral domain ranging from infrared to X-rays, brilliance, continuous injection to ensure beam stability at the scale of a micron, ranks this multipurpose installation at the highest level of international competition.

1. Position (m/f)

The post will be based on ODE, a state-of-the art XAS and XMCD beamline.

The X-ray Absorption Spectroscopy (XAS) and the X-ray Magnetic Circular Dichroism (XMCD) under pressure techniques are probe of structural, electronic and microscopic magnetic properties. The classical method of recording absorption spectra is the step by step measurement of the absorption coefficient for each energy point. Another way is the use of a bent monochromator to eliminate the stepwise scanning of the X-ray energy. This is the so-called "dispersive mode". The main advantages of Dispersive XAFS are the focusing optics, the short acquisition time (few ms) and the great stability during the measurements due to the absence of any mechanical movement. These advantages allow the study of small samples, 60 μ m at SOLEIL, which is mandatory in the case of high pressure studies. The dispersive EXAFS station at SOLEIL (ODE-beam-line) gives the possibility to perform numerous pressure XAS and XMCD experiments with an excellent statistic. Recently X-ray diffraction (XRD) and Raman techniques have also been combined to the absorption techniques on the ODE beam-line.

2. Mission

You will work in collaboration with the project leader and the other members of ODE group in the beam-line, operating and upgrading of the beamline. You will take part in the in-house research activities of the group and you will be expected to lead your own research program in the scientific domains covered by the beamline: electronic and structural properties of advanced materials. It is estimated that you will contribute to the scientific output and upgrading of the beamline. You will be in charge or to assist in several duties related with the development and exhaustive understanding of the relevant techniques and equipment of the beamline, as well as you will be involved in the production of documentation and protocols for beamline operation, and implementation of strategies for training users. **You will be particularly in charge of the XAS/XRD combination development.**

Your activity will be focused on polyamorphism. Disordered matter under extreme conditions of pressure and temperature exhibits structural changes whose nature is still today not completely understood. Polyamorphism occurs when different structure types for the same disordered substance, like a liquid or a glass, coexist. This fascinating anomalous structural behavior, first observed in H₂O ice and GeO₂, has been only recently observed in liquid and it is still under investigation. The study of polyamorphic matter has strong interdisciplinary implications, ranging from earth and planetary science to chemistry and material science. In recent times, existence of polyamorphism has been discussed for a variety of solid systems, including amorphous silicon and germanium. In those simple systems the competition between a low-density and a high-density amorphous phase can result in a pressure-induced transition, leading to new properties of these technological materials. Experiments and theoretical calculations suggest that systems having open atomic arrangement at low pressure are the most promising candidates for observing polyamorphic transitions. Notably, these include systems with locally tetrahedral molecular structure such as Si, Ge, C, SiO₂, GeO₂ as well as several tetravalent III-V semiconductors which exhibit an increase in packing efficiency upon increasing pressure. Reversible and irreversible amorphous-amorphous transformations have been observed under high pressure by different experimental techniques for a variety of condensed systems. In particular, high pressure experiments combining Raman, x-ray absorption and diffraction techniques have recently carried out on amorphous germanium and on amorphous germanium-silicon alloys on the ODE beamline. To this purpose, a modification of the standard setup at the ODE beamline that allows collection of x-ray diffraction (XRD) patterns using a MAR345 Image Plate detector is in development. A portable micro-Raman spectrometer to be coupled with absorption techniques is now also available on the beam-line. The combination of techniques has proved to be crucial to explore and understand the various transitions in amorphous specimens. A

post-doctoral position is available to study the structural and electronic properties of tetravalent semiconductors (in particular amorphous Si and Ge alloys and compounds) that undergo amorphous-amorphous transformations under pressure, by XAS, XRD and Raman techniques.

This post doctoral position lies within the scope of strong collaborations between the ODE beamline managed by François Baudalet at SOLEIL and the team managed by Andrea Di Cicco at the IMPMC, Université Pierre et Marie Curie (Paris, FRANCE) and at the University of Camerino (ITALY).

3. Qualifications & Experience

You should hold a PhD degree in science related to the activities of the beamline (physics, chemistry or a connected discipline). A strong background in at least two topics among EXAFS, XRD, and high-pressure techniques (Diamond Anvil Cells), is required, with a bonus for XRD. Previous experience in X-ray instrumentation as well as Raman experience will be welcome. The following attributes will be well-regarded: effective communication skills and ability to communicate with people at all levels, strong time organization proficiency, aptitude to work both unsupervised and as a part of a team, as well as competency in data processing and the use of analysis software.

4. General conditions

The offer concerns a Post-doctoral contract for a one year-period. A wide range of valuable training programs, research and upgrading opportunities will be accessible. Moreover, the position benefits of a progressive employment conditions and a flexible work-life balance policy.

The contract will start in November 2009.

The place of work will be at Synchrotron SOLEIL, which is located in the Paris suburbs (Saint-Aubin).

Applications should include a motivation letter and Curriculum Vitae with the addresses of three referees. Applications should be preferably registered directly on the:

<http://candidature.synchrotron-soleil.fr/VotreCandidature/> with the reference: Post-Doc ODE.

Compétences générales	Spécificité
<p>Compétences techniques de base : Polyvalence sur les techniques du web et du multimedia Créativité et aisance avec les outils de design graphique Connaissance des processus de définition des architectures fonctionnelles Connaissance des sites contributifs</p> <p>Compétences associées : Savoir animer un groupe Capacité d'écoute Curiosité intellectuelle Anglais lu et écrit Fort intérêt pour les questions et la communication scientifiques</p>	<p>Techniques utilisées : Maîtrise des langages Javascript, HTML, Maîtrise des éditeurs de page (front page et Dreamweaver) et des logiciels de PAO (Photoshop, Illustrator, X-press) Développements en PHP- MySQL Connaissance des applications flash et Oracle Portal server</p>
<p>Capacités liées à l'emploi : Rigueur et organisation dans la gestion et la programmation des dossiers Autonomie et imagination dans le montage des projets Forte capacité d'adaptation pour intégrer des cultures différentes Savoir conjuguer agir et rendre compte</p>	

4. Contrat de travail

Cette offre correspond à un poste à durée déterminée. La rémunération sera basée sur le barème des salaires de SOLEIL, et déterminée selon les qualifications et l'expérience professionnelle du candidat.

Le lieu de travail est Saint-Aubin (Essonne).

La candidature doit contenir une lettre de motivation et un curriculum vitae et devra être déposé directement sur le site :

<http://candidature.synchrotron-soleil.fr/VotreCandidature/> avec la référence : DIR - 006.