



Post Doctoral Position

OPERANDO investigation of Battery Materials



LRCS Amiens, FRANCE

Salary:	Starting from € 25.000 neat / year
Placed On:	Monday August 27, 2018
Closing Date:	Friday September 28, 2018
Interview Dates:	October 2 nd & 3 rd , 2018
Reference:	UFO Project

One LRCS-funded postdoctoral research position is available to carry out crystallography work on cathode materials for advanced batteries, within the LRCS Laboratory in Université de Picardie Jules Verne in Amiens, France. The work will be conducted under the scientific supervision and responsibility of Assoc. Prof. Jean-Noël CHOTARD and Prof. Christian MASQUELIER.

The research project will focus on i) the development of new operando electrochemical cells to be operated in transmission geometry within a brand new X-ray diffractometer and ii) the operando study of electrochemical mechanisms within high rate positive electrode materials for Lithium or Sodium ion batteries.

This work forms part of intense collaborative research work within the French RS2E Network (in particular with the group of Laurence CROGUENEC in ICMCB Bordeaux) and with large scale facilities such as ALBA Synchrotron (Dr. François FAUTH), SOLEIL Synchrotron (Dr. Antonella IADECOLA) and the ILL Grenoble (Dr. Emmanuelle SUARD)

Previous experience in crystal chemistry and crystallography and a solid track record of peer-reviewed publications are essential. Knowledge on batteries is a plus but not essential. This position is available as soon as possible, for one year at least. For information on the research group please visit the web sites: <https://www.lrcs.u-picardie.fr/> & <https://www.christian-masquelier.fr/>. For enquiries about the position and application please contact Jean-Noël CHOTARD and Christian MASQUELIER @ jean-noel.chotard@u-picardie.fr & christian.masquelier@u-picardie.fr

Background

The Battery research area is extremely competitive. One of the key points lies in the knowledge of the crystal structures of the materials in order to better understand the mechanisms involved during cycling. The so-called “operando measurements” are then crucial. In this field, the LRCS (Laboratoire de Réactivité et de Chimie des Solides) in Amiens-France, has already demonstrated in the past its capacity for innovation. Three electrochemical cells allowing concomitant measurements of electrochemical and structural properties have already been developed. The first, used in a powder diffractometer [1], is now marketed worldwide via BRUKER. A second version, developed in 2010 during the ANR PULSSE (SOLEIL, IMN, LRCS) is used in transmission mode at the synchrotron, either for X-ray diffraction or X-ray absorption [1]. Finally, a third cell adapted to neutron diffraction was born thanks to a thesis in collaboration between our laboratory, the ICMCB and the Grenoble ILL [2]. These various innovations allow us to reveal new reaction mechanisms within the electrode materials as well as a better understanding of the Li and / or Na diffusion in batteries, as shown by recent experiments at the ALBA synchrotron [3].

References

- [1] Leriche, J. B. *et al.* An Electrochemical Cell for Operando Study of Lithium Batteries Using Synchrotron Radiation. *J. Electrochem. Soc.* **157**, A606–A610 (2010).
- [2] Bianchini, M. *et al.* Spinel materials for Li-ion batteries: new insights obtained by operando neutron and synchrotron X-ray diffraction. *Acta Crystallogr. Sect. B Struct. Sci. Cryst. Eng. Mater.* **71**, 688–701 (2015).
- [3] Bianchini, M. *et al.* Comprehensive Investigation of the $\text{Na}_3\text{V}_2(\text{PO}_4)_2\text{F}_3$ – $\text{NaV}_2(\text{PO}_4)_2\text{F}_3$ System by Operando High Resolution Synchrotron X-ray Diffraction. *Chem. Mater.* **27**, 3009–3020 (2015).