Master Thesis at LRCS	
Topic Title	***Toward the fabrication of a NaSiCON based All-Solid-State battery working at room temperature***
Principal Advisor	Seznec Vincent, vincent.seznec@u-picardie.fr, 0322825331
Co-advisor	Masquelier Christian, christian.masquelier@u-picardie.fr , 0322825791
Collaborations	Pieremanuele Canepa, pcanepa@nus.edu.sg, NUS Singapore
Funding Source, Name of project	LRCS
Web Site of Advisor	https://www.lrcs.u-picardie.fr/ ;
Date of publication of the offer	December 3rd, 2019
Deadline for application	January 20th, 2020
Date of start of the Project	After January 2020 (6 months)
Description of the Topic	This Master thesis is part of an international ANR Project between LRCS Amiens and NUS Singapore, for which one of the main objective is the fabrication of safer batteries (without liquid electrolyte), i.e. **all-solid-state** battery based on **NASICON materials**. Since few years, the enthusiasm for the development of all-solid-batteries as well as for the research of new solid electrolytes with high ionic conductivity is accelerating. The LRCS offers an exciting research environment consisting of internationally recognized researchers as well as young scientists with team spirit. Close international cooperation with top universities and institutes worldwide Top-class instruments for materials research and characterization. The main missions of the master student will be: - **The synthesis of solid electrolyte** materials with high ionic conductivity and large windows of electrochemical stability. - **The synthesis of positive electrode** materials, especially high potential, and **negative electrode materials**. An important duty will be **the control of the particles size** and the **HIGH purity** of the obtained materials, especially for the solid electrolyte. - **The Electrode formulation,** *i.e.* mixing approach of the solid compounds (active material, electrolyte, electronic conductor) present in the **composite electrodes** will be carried out in order to find the best composition with respect to the electrochemical properties. - The **fabrication** of an "All-Solid-State Batteries" (ASSB) by the **Spark Plasma Sintering** technique which has already proved the feasibility of assembling an ASSB in one step in few minutes only. - The **electrochemical characterization** of the ASSB as function of the **temperature.**
Techniques to be used	• Spark Plasma Sintering • X-ray diffraction • Thermal analysis • Scanning Electron Microscopy • Impedance spectroscopy • Galvanostatic electrochemical cycling
Skills of the Applicant	Background in materials science, chemistry or physical-chemistry Open-minded, dynamic and showing a strong motivation for experiments.
Contact (s)	vincent.seznec@u-picardie.fr, christian.masquelier@u-picardie.fr
List of documents to provide	CV + motivation letter + list of references