



THE RTRA SCIENCES AND TECHNOLOGIES
FOR AERONAUTICS AND SPACE
RECRUITS

POST-DOC POSITION

PROJECT MAISOE

➤ Profile	A recent PhD is required. Applicants should possess knowledge and experience in one or more of the following areas: electrochemistry, materials sciences, silicon and polymer-based microfabrication, measurement in liquid phase.
➤ Missions	Design, fabrication and characterization of electrochemical microcells for the detection of silicate ions SiO_4^{4-} in marine environment
➤ Duration	18-24 months
➤ Scientific Officer	Pierre Temple-Boyer
➤ Host laboratory	LAAS

Description of the project:

The oceans play a key role in climate regulation with the climate change being the most important environmental issue that human societies have to face. To increase our observing capacities, the development and deployment of autonomous, multi-disciplinary oceanic observatories is required.

In-situ autonomous biogeochemical sensing in marine environment is an immense challenge. The environment is harsh, dark, difficult to access, subject to biofouling, and characterized by large pressure, temperature and ionic strength variations... Nevertheless, the seawater long-term monitoring requires an in-situ miniaturized autonomous instrumentation able to achieve excellent figures of merit: lifetime, stability, high precision, fast response time, good reproducibility, robustness, resistance to biofouling, and low energy consumption. In this context, main attentions are given for the analysis of dissolved nutrients (silicate SiO_4^{4-} , phosphate PO_4^{3-} and nitrate NO_3^- ions) in marine environments. Submersible colorimetric analysers have been developed. However, their use is characterized by significant energy and reagents and their main drawbacks are their lack of autonomy, size and weight. Electrochemistry provides promising reagentless methods to go further in miniaturization, detection performances and energy requirements. Nevertheless, electrochemical cells have still to be integrated in silicon technology to develop low cost, mass fabricated microsensors.

The French "Microlaboratoires d'Analyses *In-Situ* pour des Observatoires Expérimentaux" (MAISOE) project offers a post-doctoral position dealing with the development of electrochemical sensors for oceanographic applications. The aim is to design, fabricate and characterize electrochemical microcells for the detection of silicate ions SiO_4^{4-} in watery phase. The study will emphasize multi-disciplinary aspects related to electrochemistry, silicon and polymer-based microfabrication, measurement interfaces, and analysis in liquid phase. The final goal is to build a complete detection microsystem adapted to seawater analysis.

Partners: LEGOS, LGC

Contact: Pierre Temple-Boyer, LAAS-CNRS, M2D group
7 avenue du colonel Roche, 31077 Toulouse Cedex 4, FRANCE
E-mail: temple@laas.fr, Phone: +33 561 336 954, Fax +33 561 336 208, <http://www.laas.fr>