

Post-doctoral position

LAAS, LEGOS and LGC, Toulouse, France

Design, fabrication and characterization of electrochemical microsensors for the detection of silicate ions in liquid phase

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 dramatically increase our observing capacities, we need to develop and deploy autonomous, multi-disciplinary oceanic observatories for a long-term monitoring of the environment. 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) program is financially supported by the French Foundation of Scientific Cooperation "Sciences et Technologies pour l'Aéronautique et l'Espace" (STAE). In the frame of the MAISOE project, the offered post-doctoral position will deal 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 multidisciplinary 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. This work will be carried in close cooperation between three French laboratories from Toulouse: the "Laboratoire d'Analyse et d'Architectures des Systèmes" (LAAS), the "Laboratoire d'Etudes en Géophysique et Océanographie spatiales" (LEGOS) and the "Laboratoire de Génie Chimique" (LGC).

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. Appointment will be for a 24 months duration and may start on March 1st, 2010. Annual gross salary will be around 34000€ (annual net salary: ~ 27 000€).

Letters of application, a C.V. with complete list of publications, a short statement of research interests and the name of two referees should be sent to Dr Pierre Temple-Boyer:

Pierre Temple-Boyer

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