



Postdoctoral position in polymer chemistry

Poly(trimethyleneCarbonate) – design of modular ecological Antifouling coating



CarbonARA

Biofouling is a phenomenon inherent to all submerged structures in the marine environment, requiring expensive curative and preventive measures. Protecting submerged surfaces is essential. Currently, the most widely used commercial systems have an impact on the environment. Biocide-based coatings release molecules that have an impact on the ecosystems, and fouling-release coatings tend to release oils and/or non-biodegradable compounds that give rise to bioaccumulation problems. Polydimethylsiloxane (PDMS) is the main polymer used in the second kind of coating (fouling release). This hydrophobic petroleum-based polymer has anti-adhesive properties. However, its effectiveness over time and under static immersion is low and no alternative exists.

The proposed project is part of ANR JCJC CarbonARA. The aim is to improve coatings based on polytrimethylene carbonate (PTMC) developed in the first part of the projects to replace PDMS. This hydrophobic polymer is non-crystalline and presents the advantages of being both biodegradable and resorbable. The postdoctoral student will focus on two main areas to reduce the environmental impact of these new coatings. The first step will involve synthesizing the polymer using more sustainable procedure, such as enzymatic polymerization or the use of safer solvents. The second step will focus on the crosslinking process to form the coatings. The objective is to modulate their biodegradability and their lifetime without altering their physico-chemical properties. Furthermore, the candidate will evaluate the environmental impact using a life-cycle assessment. For this, he/she will use the results of previous biodegradation and ecotoxicity assays in seawater. To demonstrate that the modifications do not affect the antifouling properties, the anti-adhesive efficiency will be evaluated *in situ* through immersion in the Bay of Lorient (Brittany).

Requirement: This position requires a Ph.D in polymer chemistry chemistry. Good skills in macromolecular chemistry (ring opening polymerization) and in organic chemistry (monomer synthesis). The candidate must also have expertise in standard analytical techniques for characterization of molecules and materials (NMR, FTIR, contact angle, microscopy technic...). A first experience in in life-cycle assessment will be viewed positively.

Net salary: Approximately 2200 €/months

Localization: University de Bretagne Sud Lorient - LBCM (Laboratoire de biotechnologie et chimie marines). LBCM is a recent research team (EMR 6076) affiliate to the CNRS (Centre national de la recherche scientifique). The research is carried out in a multidisciplinary way and at the interface between chemistry and biology. In Lorient, the research aims to understand biofilm dynamics in order to control them through

the development of anti-biofilm coatings. The laboratory has several analytical (GPC, Maldi-Tof, SEM, AFM, CLSM, contact angle, FTIR, NMR 60 MHz) and an *in situ* site for immersion in the Bay of Lorient.

Supervisor: Associate Pr. Fabrice Azemar - fabrice.azemar@univ-ubs.fr