

Post-doctoral position LGC Toulouse-ANR JCJC PROJECT BIOCOM

Impact of modified membrane material on the adhesion of bacteria and production of Extracellular Polymeric Substances (EPS)

Duration: 18 months

Starting date: October-December 2018

POSTDOC 1:

Keywords: EPS (Extracellular Polymeric Substances), liquid chromatography, fluorescent microscopy, quantification of proteins, polysaccharides and lipids, bacterial enumeration, filtration membranes, water treatment

Context: The control of biofouling is required to improve membranes performances and to reduce high operational cost due to cleaning. Biomimetic membranes represent the next generation of filtration membranes used for water treatment. The project BIOCOM (<http://lgc.cnrs.fr/les-projets/projet-biocom/>) aims to provide an innovative biomimetic membrane with anti-biofouling properties for water treatment by incorporating natural bioactive molecules that act as Quorum Sensing Inhibitors (QSI), such as vanillin and derivatives [1]. The main objective of this project is to characterize the impact of bioactive surface modification of membrane used for water filtration on physico-chemical properties of membrane and on adhesion of both bacteria and bacterial Extracellular Polymeric Substances.

The Membrane Process team at the LGC (UMR CNRS 5503, INPT, UPS) has developed since many years a recognized knowledge in the modification and characterization of membrane surfaces and filtration performances. This expertise is implied in the development of new membrane material with antifouling properties using approach inspired by biological mechanisms in particular. Different strategies are currently applied for the modification on membrane material and biological molecules could be free or immobilized. As a central point, it is expected that the biological activity of the molecules will be maintained and interfere in the production of Extracellular Polymeric Substances (EPS), limiting adhesion of bacteria on surfaces and biofilm formation. In order to evaluate the impact of the modification on the biofouling, it is required to characterize and quantify the production of EPS. For this purpose, in the frame of ANR BIOCOM, a millifluidic device has been thought and adapted for direct observation of adhered and removable biological foulants (bacteria and EPS) under fluorescent microscopy [2]. Other classical methods of quantification for EPS (spectrophotometry, HPLC, ..) and adhesion tests [3] will complete the results obtained under microscope [4, 5] to select the modified membrane material to be tested under filtration experiments. The stability of the new membrane would have been evaluated over time in controlled hydrodynamic conditions.

Profile:

Applicants must have completed a Ph.D. in Microbiology or biochemistry with expertise in biofilms characterization. Additional experience in filtration and/or microscopy would be appreciated and at least S/he will have to demonstrate interest in filtration issues. Skills in statistical

analyses are recommended. The successful applicant should have the motivation and enthusiasm to lead the project from fundamental research to application. S/he should be able to work independently and as a member of a multidisciplinary team in collaboration with chemists in the lab. S/he will work in collaboration with one PhD student and another post-doc in the frame of the project and should have some quality to supervise a student (engineer or master). S/he would be brought to work in collaboration with academic French partners of the project (LBAE in Auch, LISBP and LAAS in Toulouse) but also out of France with the possibility of a 3 months mobility. The optimal candidate will be curious, creative and highly motivated as S/he will have to adapt and work with microfluidic devices under microscope using living organisms and fluorescent probes to study adhesion and fouling process. S/he should be rigorous enough to perform experiments with biological elements. French spoken is a plus but not necessary.

Application:

Interested and highly motivated applicant should forward a cover letter stating why the applicant is interested in this position, a complete CV with a publication list and 2 academic referees (with address, phone number and email). Minimum salary: 1806 €/month (NET), depending on the experience.

Contact:

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Bibliography:

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