

Master and Engineer Internship: 2020-2021

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Research groups: BioMEMS / NBI

Title : Développement de surfaces micro/nano texturées anti-biofouling

Development of micro/nano textured anti-biofouling surfaces

Abstract :

In the food industry and biomedical domain, the formation of deposits, biofilms and surface pollution is a crucial point for food security, health (nosocomial infections) and budgetary issues (very important cost of cleaning).

The aim of this internship is to develop anti-biofouling surfaces for both the milk processing industry and biomedical applications (instruments (endoscope), scalpel, sample tubing...). While numerous publications in the scientific literature has shown the potential of superhydrophobic surfaces (biomimetic surfaces inspired by the Lotus leaf), only few examples of applications in real conditions have been presented. Recently, surfaces called SLIPs (SLippery Infused Porous Surfaces) have shown their interest in a large number of applications. We have been able to highlight their remarkable properties in the field of food processing [1].

This master's subject aims to continue the work already undertaken: from stainless steel surface (most used material in food industry and in biomedical), realization and optimization of the electrochemical etching (porosification) followed by a chemical modification of their surface and then their imbibition with an inert liquid compatible with the intended application. Once these surfaces have been characterized (optical profilometer, SEM, AFM, ...), they will be tested in a pilot milk treatment line (collaboration with INRA Villeneuve d'Ascq) or incubated with different biological media (blood, plasma, cell culture...).

This internship will be done in collaboration with the UMET laboratory of the University of Lille with Prof. M. Jimenez, PI of ANR ECONOMICS project, in which this internship will take place. The selected person will sustain an already started PhD in september 2018. A background in chemistry and material sciences is mandatory and a strong interest in micro / nanotechnology will be much appreciated.

[1] ZOUAGHI S. et al. ACS Appl. Mater. Interfaces 9, 31 (2017) 26565-26573