ITI HiFunMat Master Internship Proposal

☒ M 1 ☒ M 2

Development of electrodeposited coatings of catechol-based polyelectrolytes as adhesive interface and their enzymatic degradation

Internship supervisor

Name, first name	Boulmedais Fouzia
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Laboratory	Institut Charles Sadron
Collaboration with a HiFunMat member (*please indicate their name*)	☒ No ☐ Yes :

Student profile looked for

Master program (*more than one box can be ticked)*	☒ Material science and engineering ☒ Chemistry ☐ Physics
Other indications if necessary	IMPORTANT for M 2 students: The candidacy has to be sent at least 3 months before the beginning of the internship to apply the online CNRS procedure to allow hosting the candidate in the lab.

Internship description

The needs of society in terms of environmental protection, energy, resource-saving, and waste reduction represent new challenges for all fields of industrial production. Many devices are based on combinations of materials assembled via an adhesive interface. Their production often requires energy-intensive processes or the use of hazardous substances. New perspectives for the design of bioinspired and biodegradable adhesives are offered by compounds derived from mussel proteins (dopamine, polydopamine) or plants (polyphenols such as tannic acid). These compounds adhere to virtually all types of surfaces thanks to the chemistry of catechols.

The M ERA-NET InsBioration project aims to transfer scientific knowledge on these natural adhesive compounds to industrial production. Within the framework of the project, the master student will develop nanofilms based on polymers modified by catechols by electro-crosslinking by applying an electric potential on an electrode (Langmuir 2015, 31, 13385; Mater. Adv. 2022, 3, 2222). The optimization of the nanofilm deposition, their physicochemical characterization as well as their enzymatic degradation will be studied during the internship.

Activities:

- Preparation of aqueous solutions of water-soluble polymers
- Monitoring of the deposition of the nanofilms by quartz crystal microbalance and ellipsometry.
- Characterization of the enzymatic degradation of the films.

Profile: A motivated experimentalist with polymer, analytical chemistry, or material science background who is interested in studying the physical chemistry of polymeric films on a conductive surface using electrochemistry. No knowledge of electrochemistry is needed.