PHD THESIS OFFER

DENTAL SPLINT EMBEDDED MULTIMODAL PLATFORM FOR INTRA ORAL BIOCHEMICAL AND BIOMECHANICAL DIAGNOSIS

Keywords: additive manufacturing and printing techniques, flexible electronics, biosensors.

In the framework of personalized healthcare, the dental splint, already commonly used as a therapeutic tool by many patients would be a well suited platform to develop a sensing and connected medical device integrating electronic parts to gather information on the manducatory system disorders as well as on biomarkers contained in saliva. Taking advantage of the boom in additive manufacturing, the aim of the project is to produce a connected multisensory platform that can be placed in the mouth, without any assembly operations. The challenge is to **integrate electronic devices** in a complex shaped polymer object, **through the use of printed and flexible electronics methods.**

The recruited PhD student will be involved in the consortium of the ANR project "e-Splint" devoted to the elaboration of such instrumented splint. He/She will be in charge of designing, printing and qualifying the three sensors of the embedded multimodal platform. These sensors, i.e. force[1], pH[2], glucose[3], will consist of printed planar thin films (layer-by-layer technology) deposited on flexible polymer foils of typical thickness 100 µm. The development of each sensor will require: (i) an ink formulation step for adapting the rheology of functional inks (surface tension, viscosity) to the features of printing equipment; (ii) the printing process with low-cost techniques such as inkjet and dispensing (prototyping) or screen printing (towards industrial process), available at Print'Up Institute[4]; (iii) the calibration and evaluation of the sensors performances in simulated buccal environments. He/She will participate to the integration of the sensors in the final device through interactions with other partners of the project such as interfacing the sensors with the command electronics as well as embedding them in polymer splints produced by additive manufacturing.

Expected candidate profile: Applicants should have a master 2 degree or equivalent diploma in a relevant physics, chemistry or materials science discipline. An early experience in printed electronics or electrochemistry will be appreciated. Applications including a full CV, academic records, publication list (if applicable), should be sent electronically.

Starting date: 1st October 2026 – Allocated grant from Agence Nationale de la Recherche

Hosting team: Bioelectronics, Smart Surfaces and Energy (BIOSSE)
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[1] A. Claude et al *Sens. Actuator A Phys.* 295 (**2019**) 532.
[2] K. Chawang et al *Chemosensors* 11 (**2023**) 267.
[3] V. Marchianò et al *Chem. Mater* 36 (**2023**) 358.
[4] www.printupinstitute.fr