

## PhD position ULille

**Title:** Elaboration of stimuli-responsive hydrogels for the control release of therapeutics from connected wound dressings

**PhD locations:** Lille University, UMET laboratory, ISP team, 59655 Villeneuve d'Ascq

**PhD Directors:** Pr. Joël Lyskawa, Dr. Nicolas Tabary and Dr. Cédric Zobrist

**Context:** The Interreg DIAMOND project (Funded by Europe) gathers partners from universities and research centers in France and Belgium specializing in textiles, biomaterials, sensors and connected systems. The objective of this project is to develop a connected wound dressing including sensors allowing, in one hand, to monitor in real time the biological parameters indicating an infection or poor wound healing and, on the other hand, to deliver therapeutics from a stimuli-responsive hydrogel incorporated in the wound dressing.

**Project description:** The first objective of the thesis will be dedicated to the design and the characterization of the hydrogels composed of biomacromolecules and nanoparticles containing therapeutics. A first strategy will employ the NIR light irradiation to trigger the release of the therapeutics from the hydrogel (photothermic therapy). A second approach will be oriented towards the utilization of polymers responding to an electrical stimulus.

The **work program** will include the modification of hydrophilic biopolymers, the formulation of the hydrogel and physicochemical characterizations such as NMR, UV-vis, IR, SEC, electrochemistry, zeta potentiometry, rheology and electronic microscopy. The release properties of the active material will be characterized by suitable methods to test their response to light/electric stimulation. The cytocompatibility of these hydrogels will be evaluated in collaboration with INSERM U1008 (Advanced Drug Delivery Systems) which will support biological and microbiological characterization as well as the *in vitro* evaluations. Interactions with partners in other specialties will be required to combine the stimuli responsive hydrogels with electronic (sensor) and textile components of the connected wound dressing.

**Requirements:** To apply for this PhD position, candidates must have completed a Research Master (or an equivalent 2-year MSc) degree in polymer chemistry. A good experience in organic chemistry, synthetic polymer, polymer science and physico-chemistry is required. Experience in Biomaterials is a plus. Candidates should have excellent communication skills and the ability to work collaboratively in an interdisciplinary team. The ability to work independently, to take initiative on experimental developments is essential to the project.

**Language:** good command of English (written and spoken) is required.

**Duration:** 3 years

**Applications:** If you are interested, please email a motivation letter including your interests in the research area, one or two references, your academic transcripts and a CV including your research experience to Pr. J. Lyskawa ([joel.lyskawa@univ-lille.fr](mailto:joel.lyskawa@univ-lille.fr)) Dr. N. Tabary ([Nicolas.tabary@univ-lille.fr](mailto:Nicolas.tabary@univ-lille.fr)) and Dr Cédric Zobrist ([cedric.zobrist@univ-lille.fr](mailto:cedric.zobrist@univ-lille.fr))

**Gross Salary:** ≈ 2000-2200 Euros/month