Centrale Lille, laboratoire UMET (Unité Matériaux Et Transformations), UMR 8207 CNRS.
Cité Scientifique, 59650 Villeneuve d'Ascq.

PhD Proposal

Self-Immolative POlymers for NIR- and UV-responsive Materials

SIPONIUM

Keywords: Polymer chemistry, self-immolative polymers, triggered depolymerization, monomer synthesis, stimuli-responsive polymers, electrospinning, controlled drug-release, organic chemistry.

The project: The SIPONIUM project aims to develop new light-sensitive self-immolative polymers (SIPs). The special feature of the SIPs is the ability to undergo quick depolymerization reaction in response to external stimulus. By taking advantage of this unique character, it becomes possible to scaffold temporary structures that can be collapsed in due time, for drug delivery applications.

Research aims: During this project, a monomer bearing a light-sensitive group will be synthesized according to a multi-step synthesis procedure that was already set in the research team, then this monomer will be used to design amphiphilic copolymers. The physicochemical and physical properties of the obtained materials will be investigated. Furthermore, the copolymers will be used to make drug-loaded nanofibers (NFs) by electrospinning and melt electrowriting processes. Drug release kinetics, antibacterial activity and cytotoxicity of the NFs will be investigated in collaboration with the ADDS U1008 laboratory, Lille.

Candidate profile and recruitment terms:
Knowledge and skills: the candidate should have a strong background in polymer chemistry, synthesis of monomers and polymers and design of macromolecular architectures. Experience in polymer processing would be appreciated. A knowledge of characterization techniques of polymers is required: NMR, SEC, DSC, WAXS, SAXS, SEM, TEM and rheology, an experience in drug-release measurement or microbiological analyses would be a plus.
Required training: Master degree or engineer by the start date.

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Supervisor: Kedafi BELKHIR, maître de conférences, at Centrale Lille.

Start date and duration: 1st April 2023, with a duration of 36 months.

Salary: ~ 2000 euro gross/month.

Funding source: projet ANR SIPONIUM.

Application must include:

-Curriculum vitae with the complete contact details of the candidate.

-Cover letter.

-Contact details of two references

-Transcripts of the two years of the master's degree.

The files must be in PDF format.

To apply, these documents should be sent to Kedafi BELKHIR: kedafi.belkhir@centralelille.fr

Applications are accepted both in English and in French.

The UMET laboratory: https://umet.univ-lille.fr/

The laboratory "Unité Matériaux Et Transformations" was created in January 2010 following the merger of four former laboratories of the Lille campus. The UMET laboratory now hosts a large portion of the research in Materials Science of Université de Lille. The laboratory includes approximately 80 professors and assistant professors, and CNRS researchers, 40 technical and administration staff, 60 PhD students, and 15 temporary contracts researchers or emeritus faculty. There are six research groups:

i) Matériaux Moléculaires et Thérapeutiques. ii) Matériaux Terrestres et Planétaires. iii) Métallurgie Physique et Génie des Matériaux. iv) Ingénierie des Systèmes Polymères. v) Plasticité. vi) Processus aux Interfaces et Hygiène des Matériaux.

The PhD thesis will be carried out in the ISP team (Ingénierie des Systemes Polymères)