.Université de Technologie de Compiègne – Thesis proposal

Part 1: Scientific sheet	
Thesis proposal title	New polymeric hybrid scaffold for tridimensional human tissue engineering and experimental toxicology
PhD grant	Ministry of Research Grant, UTC multi-team effort support
Research laboratory	Involved UTC laboratories: UMR 7338 : BioMécanique et BioIngénierie (BMBI), team Cells, Biomaterials, Bioreactors (CBB) (https://bmbi.utc.fr/) TIMR, EA4297, UTC-ESCOM (https://www.utc.fr/recherche/les-unites-de-recherche-de-lutc/transformations-integrees-de-la-matiere-renouvelable-timr-ea-4297.html)
Thesis supervisor(s)	Director : Christophe Egles (HDR), BMBI-UTC Co-Director : Frederic Delbecq (non HDR), ESCOM-TIMR-UTC
Scientific domain(s)	Primary: Biology, biomedical and health sciences Secondary: Chemistry and interface
Research work	A proper environment is a key feature of successful tissue reconstruction. In this present thesis, we will test new decellularized composite materials decorated with volvox algae proteins for biomedical applications. 1. We will characterize the physicochemical properties and capabilities of algal proteins to create scaffolds regarding their interactions with biological cells as well as the investigation of specific applications using these new macromolecules. Some chemical modifications should be carried out to modulate the physico-chemical properties of the proteins such as solubility and aggregation. 2. Chemical modifications of the algal proteins will be also performed to conjugate these proteins with biopolymer such as modified polysaccharides (cellulose, etc) mixed or not with biocompatible synthetic polymers to generate new functionalized scaffolds such as membranes or 3D printable hydrogels that can be repopulated by eukaryotic cells and used as scaffolds for tridimensional tissues. 3. We will investigate, using this approach, the creation of in vivo persistent tissues (dermis, skin, or else) exhibiting structured 3D cell architecture and blood connection inside these scaffolds. This thesis paves the way for the development of volvocine algae and their derived material as bioinspired functional bricks for tissue-engineering as well as the development of animal-free scaffolds based tissues for experimental toxicology. This research project comes as the development of the patent application: DI2017n°2-1201(EGLES)-SL00676 (volvox).
Key words	Regenerative medicine, Agri-resources, polymer chemistry, composite materials, biomaterials, bioinspiration and 3D printing.
Requirements	The candidate should have advanced knowledge in chemistry and/or biology, an experience in biomaterials or cell culture would be an interesting asset
Starting time	From the last semester of 2019

Location	UTC (BMBI), TIMR (UTC-ESCOM)

Funding/Cofunding or/and partnerships:

☐ **Région Hauts de France (cf dossier)**
☐ **Labex**
☐ **Ecole doctorale**
☐ **Partenariat industriel**
☒ **Autre (préciser) SATT Lutech (investment fund)**

Part 2: Job description	
Duration	36 months
Additional missions available	no
Research laboratory	UMR 7338 : BioMécanique et BioIngénierie (BMBI), team Cells, Biomaterials, Bioreactors (CBB) (https://bmbi.utc.fr/) TIMR, EA4297 ESCOM (http://www.utc.fr/timr)
Material resources	Collective office, computer, culture room (L1 and L2), histologic and cytologic characterization platforms, chemistry laboratory, physicochemical characterization platform.
Human resources	21 EC, 9 BIATSS/ITA, 35 doctorants, 5 post-docs (BMBI) 43 EC, 7 BIATSS, 36 doctorants (TIMR)
Financial resources	European FEDER fund, mixed laboratories regional initiative
Working conditions	Joint meetings every month, large autonomy in the approach,
Research project	3DToxLab: Nouveaux outils cellulaires et tissulaires destinés à la toxicologie et la pharmacologie
National collaborations	yes
International collaborations	no
International cosupervision (cotutelle)	no
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Please contact first the thesis supervisor before applying online on https://webapplis.utc.fr/admissions/doctorants/accueil.jsf