Thesis project

Development of bio-based resorbable filaments as sutures

UMET - Unité Matériaux Et Transformations, University of Lille, Villeneuve d'Ascq, France.
UCCS – Unité Catalyse et Chimie du Solide, University of Lille, Villeneuve d'Ascq, France.
GEMTEX - Génie et Matériaux Textiles, ENSAIT, University of Lille, Roubaix, France.

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Today, France and Europe are almost entirely dependent on foreign suppliers for their supply of resorbable sutures. This dependence, in an area as critical as surgery, represents a major health, economic and strategic risk. In the event of a logistical, geopolitical or health crisis, access to these devices may be limited or slowed down, jeopardising the continuity of care and the country's medical sovereignty.

Recently, BKB Chemicals developed the production of bio-based glycolic acid, allowing the synthesis of glycolide monomer, in order to manufacture polyglycolide (PGA), used to produce resorbable sutures. This patented process makes it possible for the first time to:
• Produce a bio-based resorbable suture that complies with medical and environmental requirements.
• Ensure complete traceability, from the raw material to any traces of contaminants.
• Create a robust, replicable Made in France supply chain.

The objective of the present project is thus to develop medical grade bio-based polyglycolide with characteristics compatible with its use as resorbable sutures. This will be conducted in three steps dealing with: 1) development and screaming of suitable polymerization catalysts to get high molecular weights PGA; 2) the upscale of the reaction; 3) melt-spinning of the resulting bio-based PGA.
This work will be developed in collaboration with BKB Chemicals https://bkb-chemicals.com/ and three academic laboratories from the University of Lille UCCS, UMET and GEMTEX. The UCCS (Solid State Catalysis and Chemistry Unit, https://uccs.univ-lille.fr/) laboratory and in particular the CADICOM team will work specifically on the polymerization of bio-based glycolide at the lab scale, and thus the screening of catalysts that will be suitable for reactive processes at UMET. Then, ISP team of UMET (Materials and Transformations Unit, https://umet.univ-lille.fr/) laboratory will deal will the upscale of the polymerization of bio-based glycolide by reactive extrusion. Finally, the GEMTEX (Textile Materials Engineering, https://www.gemtex.fr/) laboratory at ENSAIT-Roubaix will afford its expertise in polymers and their processing (melt spinning and bulk and surface functionalization) required to design resorbable suture filaments.

Candidates profile

The candidates must have solid knowledge in the field of polymer chemistry, allowing him/her to carry out this multidisciplinary thesis work involving polymerization catalysis, polymer processes, and the characterization of the resulting polymer materials. English speaking is mandatory.

Applicants must submit: a cover letter, a list of grades obtained in the Master degree, the names and contact details of professional references

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