Master 2 Internship

Development of novel levoglucosenone-derived biodegradable polymers

URD Agro-Biotechnologies Industrielles (ABI) – AgroParisTech
CEBB - 3 Rue des Rouges-Terres, 51110 Pomacle

Host Laboratory: Located at the heart of the Pomacle-Bazancourt biorefinery, URD ABI AgroParisTech is a research and development unit of AgroParisTech dedicated to the valorization of agroresource and biorefinery byproducts. With expertise in white biotechnologies, green chemistry, and process engineering, the team works on multi-disciplinary research projects aiming at the development of new industrial processes allowing integrating the transformation of byproducts of agriculture into high value-added chemicals such as polymers, fine chemicals, functional additives or cosmetics.

Work context and objectives: Applying the principles of green chemistry to polymer synthesis is crucial not only to resolve the environmental and waste management issues of the production processes but also to turn biomass waste into new high-performing sustainable materials. The current century is witnessing a green revolution where the sustainable synthesis of green renewable polymers has emerged as a hot topic. Up-to-date, the vast majority of commodity polymers still rely on cheaper but non-renewable fossil feedstocks. To overcome the limited availability of petrochemicals, biomass feedstocks (*e.g.,* lignin, cellulose, terpenes) can be used as abundant and renewable resources to produce chemical building blocks. Levoglucosenone (LGO) is a commercial and renewable chiral molecule that can be obtained at ton/year scale from cellulose, the main constituent of plant fibers and the most abundant organic compound on earth. The great versatility of LGO in diverse synthetic processes, such as polymer syntheses, has been recently highlighted. Special considerations were recently directed in our research center to use LGO in the production of renewable polymers. We developed a panel of new biobased monomers and polymers containing various functionalities. In this context, and considering our strong expertise in LGO, the objectives of the internship are the following:

- Green synthesis of new family of tunable LGO-derived monomers.
- Polymerization of the targeted monomers to produce 100% renewable polyesters.
- Tuning the properties of the formed polyesters by changing the monomer structure.
- Evaluation of the biodegradation of the polymers (this work will be done in close collaboration with the biotechnology team of URD ABI).
- Characterization of all polymers by different analytical techniques including NMR, TGA, DSC, SEC and FT-IR.

Candidate profile: The candidate should be a master-level student with excellent knowledge in organic synthesis. Knowledge in polymer chemistry is desirable but not mandatory. She/he should have good analytical skills. High self-motivation and a hard-work attitude are appreciated. The internship will start on February or March 1st (the latest) for 6 months.

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