Injectose project: Master Internship

Injection-molding of cellulose-based material for packaging applications to replace single-use plastics

Keywords: Twin-screw extrusion, Cellulose fibers, Injection molding, Recyclability

Working in LGP2

Recognized in France and internationally, LGP2 conducts research into the valorization of plant biomass, the development of bio-based materials (paper, cardboard, composites), recycling processes, nanocelluloses, printing processes for the functionalization of surfaces and printed electronics. You will work in the Matbio team, which is developing research in the field of biobased materials using a multidisciplinary and integrated approach, ranging from elementary building blocks derived from plant biomass to composites and fibrous materials for applications in the packaging, healthcare and construction sectors. The team is also focusing its research on process engineering for the production of bio-based materials.

Context

Your main goal is to propose alternatives to single use plastic (and make the world a better place by reducing plastic pollution). You will focus on tridimensional and complex shapes packaging like caps or bottles. Those packaging are often made of PP, PET, PE etc. and their recyclability remains low compared to paper and board (cellulose fibers). A major issue is that current paper and board processes are not able to produce complex shapes in cellulose. You will work on a very recently developed process involving injection-molding (usually used for thermoplastics or thermosets) adapted to cellulose fibers. This process is protected by two patents.

Your missions:

- Optimization of formulation (benchmark, DOE) to produce prototypes by injection-molding made of 90-95 % of cellulose fibers (such as cups and caps, see the photo below).

- Development of patented processes at pilot scale and industrial trials.
- Conception of molds for new packaging application et mechanical tests.
- Material characterization (mechanical and barrier properties).
- End of life (recyclability, compostability, life cycle assessment).

You

- Master student in material science or process engineering with background in polymer science (knowledge in cellulosic and fibrous material would be an asset).
- Fluent in English (you will work in an international lab).
- Interested in innovations, development, technological transfer applied to bioeconmy and circular economy.
- Available from February - March 2025 and for 5-6 months.
- Ready to work in autonomy, with a critical mindset, you are proactive in your project by proposing ideas and with a strong will to learn, you are able to communicate and work in team.

To thrive in your tasks, you will be supported by Emilien, postdoctoral and research engineer.

If you're ready to revolutionize packaging:

Please send your CV and motivation letter to: Emilien FREVILLE, emilien.freville@grenoble-inp.fr