

## POST-DOC POSITION AT INSA LYON

**Title : Global approach for the recycling in short circuit of used plastic by additive manufacturing**

Reference : **Green Local 3D project**

**Desired start date:** March - April 2024

**Application deadline:** 15/03/2024

**Duration: 16 months – Net monthly salary: about 2000€**

### Keywords

Additive manufacturing, rheology, multiphase systems, recycling, mechanical properties.

### Profile and skills required

PhD in mechanical or material engineering. Experience in polymer processing, rheological modeling and/or mechanical behaviour of polymers will be appreciated.

Good English communication skills.

Applicants must demonstrate rigor qualities for monitoring and planning the different stages of the project.

### Post-doctoral project, context and objectives

The Green Local 3D project<sup>1</sup> focuses on models and experiments to facilitate the short-circuit recycling of post-consumer plastic waste to be recovered and improved through additive manufacturing (AM) processes. More specifically, the objective is to study the possibility of reusing by AM types of plastics that were previously unsorted or unrecycled. In order to be able to generate a circular economy around these plastics, we will analyze the entire value loop from the collection and distribution circuit, to their valuation in the form of printable materials by additive manufacturing via the combined control of their manufacturing processes and their formulation.

The project aims to elaborate 3D printed parts from model polymer blends representative of difficult-to-sort plastic waste. The project will be performed after selecting a “reference” lab scale machine for each AM technology. The processability of the materials (filaments and pellets) will be assessed by extruding the strand with different operating parameters in order to validate the rheological criteria in terms of extrudability and geometrical stability of the strands. Conventional mechanical testing (tensile, flexural and impact properties), as well as observation of morphologies will be carried out to qualify the performance of 3Dprinted parts. The work will ensure process robustness by using different types of AM machines (FFF or FGF), from lab to more industrial scale, as well as considering variability of the composition with the objective of designing and manufacturing model industrial demonstrators.

The post-doctoral fellow will work in close collaboration with a PhD student and two researchers from IMP laboratory. In addition, she/he will benefit from scientific exchanges within the project consortium involving four public laboratories (IMP (INSA Lyon), LGI (CentraleSupélec), LRGP and ERPI (Lorraine University)), industrials and an eco-organism.

Finally, this project will enable the postdoctoral fellow to acquire a strong background in additive manufacturing, rheological modeling, and in the mechanics of 3D polymer parts.

<sup>1</sup> The **Green Local 3D project** (<https://www.insa-lyon.fr/en/greenlocal-3d>)

**Host laboratory at INSA Lyon**

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