



**PhD Student Position Offer at IMP laboratory
(Ingénierie des Matériaux Polymères, UMR CNRS 5223)**

**Thermoplastic Elastomers formulations developments for
Material Extrusion Additive Manufacturing.**

Context:

A collaborative project entitled "Improving **R**heological **B**ehavior of Functional Thermoplastic **E**lastomers for Material Extrusion Additive Manufacturing" (RHEBEL) will start in February 2025. This project is funded by the PRCI instrument of the ANR for the French side. It will focus on developing thermoplastic elastomer formulations - TPEs (e.g., TPU, TPO, TPS....) that can easily be processed by Material Extrusion Additive Manufacturing (MEAM). The collaboration will be between the IMP laboratory (Ingénierie des Matériaux Polymères, <http://www.imp-umr5223.fr>) and the Luxembourg Institute of Science and Technology (LIST, <https://www.list.lu/en/>).

PhD work subject:

At IMP the work will focus on TPV (Thermoplastic Vulcanizate). Formulations will be developed and studied to improve behavior at all stages of the MEAM process (extrusion, shape maintaining, cohesion between layers, solidification). Therefore, the target will be low viscosity, yield stress flow behavior either by adding fillers or by creating physico-chemical interactions between macromolecular chains, or even reversible reactions. In all cases, the formulation must be tailored to preserve the softness of the material in use. The printability will be first tested at IMP and then deeply evaluated at LIST by characterizing the achievable resolution and the possible shapes while minimizing the printing time. Moreover, the ultimate goal is to add peculiar functionalities of the developed material, as shape memory response, to aim "4D printing". Thus, the shape memory response of newly developed TPVs will be evaluated and the inclusion of functional fillers will be investigated.

The work will take place mainly at the IMP laboratory, under the supervision of René Fulchiron and Véronique Bounor-Legaré. Some stays at LIST are also planned.

Profile:

The candidate must have a degree of Engineer or Master in polymer materials Science with some skills in polymer chemistry, physics, mechanics and rheology with some experimental background. A very good knowledge of English is mandatory.

Contacts:

The CV and motivation letters have to be sent to René Fulchiron (rene.fulchiron@univ-lyon1.fr) or Véronique Bounor-Legaré (veronique.bounor-legare@univ-lyon1.fr)