



# Postdoctoral Position: Elaboration of new polymer filaments for multi-material objects manufactured by 3D printing.

LRGP (UMR 7274)/ERPI (EA 6737), Université de Lorraine-Nancy, France.

## Brief

We are looking for a postdoctoral candidate with a strong background in the fields of extrusion, polymer material and 3D printing to study the elaboration of filaments suitable to the manufacturing from multi-material structures used as biomaterial. The candidate should have a strong background in polymer chemistry and chemical engineering. Ideally some experience in mechanical engineering, and 3D printing would be appreciated. Candidates should demonstrate a high motivation for these topics, as well as an excellent academic track record.

## Context

This scientific investigation is done within the context of a LUE project, funded by Université de Lorraine. This specific task will be implemented mainly between ERPI and LRGP in close collaboration with 2 others laboratories LORIA and IJL as well as medical institutions of Nancy. It considers the elaboration of different filaments with varying elasticity properties and the 3D printing from multi-material structures with the former developed filaments. The selected candidate will have the opportunity to work with senior scientists from different areas (materials science, chemical engineering, mechanical engineering, polymer chemistry, medical and Information Technology) and will have the chance to work collaboratively with industrial partners.

## Topic

Among the additive manufacturing techniques, the Fused Filament Fabrication technique (FFF or Fused deposition modeling-FDM) is the most affordable as well as the easiest process to be implemented. Moreover this technique offers a wide range of materials able to be used. In some previous works we have, in order to obtain the desired mechanical properties of the final parts, studied the adhesion between two polymer filaments of different natures. Our approach was to formulate a new thermoplastic elastomer (TPE) filament having a good affinity with PLA. Our first results were quite promising. The goal of this postdoctoral work is to go further in this formulation to develop biocompatible filaments with different elasticity properties and to evaluate the adhesion interface quality between the soft and rigid part (figure 1). Eventually a new TPE copolymer will be designed for the filament if required.

• **Keywords:** Polymer chemistry, Extrusion, 3D printing, additive manufacturing, composite.

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