

Postdoctoral Research Position - Innovation in polymer recycling using supercritical fluids -

Laboratoire Ingénierie des Matériaux Polymères (IMP, UMR CNRS 5223) – France

Context :

The food packaging and polymer industries are facing a major socio-economic challenge : transitioning from a linear economic model — “*extract, manufacture, consume, and dispose*” — toward a **circular economy** that addresses resource depletion and environmental impact.

To meet these challenges, current strategies focus on **reducing packaging quantities** and **improving recycling** after use. The main obstacle remains ensuring that **recycled materials are as safe and pure as virgin materials**, free from contaminants. Finding viable solutions for the wide range of materials used in **multilayer packaging** is therefore essential.

Within the **REEMBALLE project** (“Recycling of eco-designed multilayer packaging with controlled barrier properties”), the **IMP laboratory**, a **technical research center**, and **two industrial partners** specializing in flexible multilayer film manufacturing are combining their expertise.

The project’s overarching goal is to develop an **environmentally friendly process** capable of producing **ultra-pure recycled materials**.

Mission :

The postdoctoral researcher will focus on the simultaneous decontamination and deinking of post-consumer multilayer materials using supercritical fluid technology.

The work will be organized around three main research objectives:

1. Process development:

Determine optimal operating conditions for deinking and extraction/purification of films.

Develop and optimize co-solvents to tailor the solvent power of supercritical CO₂ for both extraction and deinking.

2. Material characterization:

Conduct comprehensive physico-chemical analyses to evaluate the effectiveness of the decontamination process.

3. Property evaluation and reformulation:

Assess how the process affects the mechanical, structural, and barrier properties of the recycled materials.

Reformulate materials if necessary to meet the specifications of virgin polymers.

Environment :

The project will be carried out at the Laboratoire Ingénierie des Matériaux Polymères (IMP, UMR CNRS 5223) under the supervision of Prof. Y. Chalamet and Prof. S. Livi, in collaboration with the project partners. The REEMBALLE project is funded by ADEME as part of the France 2030 program.

The IMP laboratory is one of the leading research institutions in France in the field of polymer materials science and processing. Its activities contribute to industrial innovation, particularly through the development of new solutions for polymer recycling and the design of sustainable, low-impact materials.

Through its Fluscritex platform, IMP offers a wide range of characterization and polymer processing equipment, including several extrusion lines and supercritical fluid systems.

The laboratory also provides all necessary resources to ensure the integration, training, and well-being of its collaborators.