

## Internship - CEMEF

### Starting at April 2024, duration 5 months

TITLE	Incorporation of recycled material in polymer injection: Application to the sealing cap of high value-added packaging
Key-words (separated by commas)	Polypropylene, PCR (Post-Consumer Recycled Plastic), injection, microstructure/ final properties relationship
The global objective of work	The project aims to understand the mechanical behavior as well as the physico-chemical properties of an existing semi-crystalline polymer commonly used for injection molding of sealing caps, adaptable to high value-added packaging made of recycled aluminum (e.g., in perfumery). The objective is to comprehend why the existing material performs well and meets industrial specifications, with the goal of replacing it with a recycled material available on the market.
Context	<p>Development project for a sealing cap made of 100% PCR (Post-Consumer Recycled Plastic) material. The objective is to achieve the same performance as today's cap with a material assumed to be degraded to align with the 3R strategy (Reduce, Reuse, Recycle), involving:</p> <ul style="list-style-type: none"> <li>Reducing the amount of plastic used in each packaging (ISO volume or less)</li> <li>Using recycled material to comply with European regulations.</li> <li>Addressing the action plan resulting from the carbon footprint and LCA (Life Cycle Assessment)</li> </ul>
Detailed presentation with figure(s)	The analysis will involve examining the existing material at the microstructure level using conventional analysis methods: optical microscopy, calorimetry, and X-ray diffraction. Different thermal and mechanical transitions will be identified, along with the nature of the crystalline phases present. An assessment of the material's crystallization aptitude will also be proposed. In connection with the microstructure, mechanical behavior analyses may be conducted (via dynamic mechanical analysis or DMA), as well as analyses under large deformations (tensile or compression tests with deformation field monitoring).
Gross annual salary	To be defined
Project type/ cooperation	Internship

Skills and abilities requested	The recruited candidate should possess good skills in the mechanics and physics of solid-state polymers. The research-oriented towards an applied field will require an affinity for experimental approaches. Experimental rigor, as well as good synthesis and communication skills, will be necessary.
Location	CEMEF, MINES ParisTech, Sophia-Antipolis (06), France
CEMEF team(s)	Surfaces and Polymers (S&P)
Supervisor(s)	<u>CEMEF:</u> Christelle Combeaud (christelle.combeaud@minesparis.psl.eu) Lionel Freire (lionel.freire@minesparis.psl.eu)

**To apply:** You can only apply online by filling in the CEMEF online form on :

<https://applyfor.cemef.mines-paristech.fr/internship/>