MASTER'S INTERNSHIP OFFER

Subject: Effect of thermo-oxidation on the absorption property of SEBS polymer

Context

SEBS (styrene-ethylene-butylene-styrene) polymers are widely used as sorbent materials. Their sorption properties rely on both their intrinsic microstructure and their processing, which is usually aimed at maximizing the specific surface area through the introduction of porosity. A large specific surface area then maximizes adsorbance, while the microstructure allows the absorbance of waste within the polymer structure. [1,2]
In this internship, the approach adopted is to eliminate all porosity in order to focus exclusively on absorption. The polymer will be shaped by micro-injection into films of controlled thickness. The main objective is to study the evolution of the absorption capacity during accelerated temperature aging (thermo-oxidation) and to identify the time beyond which the polymer loses this absorption capacity.

(1) *Fabrication of Triblock Elastomer Foams and Gelation Studies for Oil Spill Remediation - Lee - 2024 - Macromolecular Rapid Communications - Wiley Online Library. https://onlinelibrary.wiley.com/doi/10.1002/marc.202400232 (accessed 2025-08-25).*
(2) *Fabrication of Triblock Elastomer Foams for Oil Absorption Applications: Effects of Crosslinking, Composition, and Rheology Factors | ACS Applied Polymer Materials. https://pubs.acs.org/doi/10.1021/acsapm.3c00567 (accessed 2025-08-25).*

Objectives of the internship

The purpose of the internship is to:

- To process the SEBS by **micro-injection** in order to obtain non-porous films.
- Develop and implement a temperature-accelerated **aging protocol**.
- Characterize the evolution of the polymer's properties at different scales:
  - **Molecular**: monitoring of oxidation, chemical modifications.
  - **Macromolecular**: evolution of structure and morphology.
  - **Functional**: absorption capacity of the material (development of the experimentation)
- Identify the degradation mechanisms and determine the **end-of-life time** of the material.
- **Model** the behavior of the polymer under real conditions.

Skills developed

The intern will acquire skills in:

1. Polymer shaping (micro-injection processes).
2. Accelerated aging methods and material durability analysis.
3. Physico-chemical characterization techniques (spectroscopies, thermal analyses, microscopies, functional absorption tests).
4. Modeling and interpretation of experimental results to link structure, properties and performance of the material.

Desired profile

Student in Master 2 or engineering school specializing in polymer materials, physical chemistry, materials science or equivalent.
Taste for experimentation, characterization and modeling.
Scientific rigor, curiosity and ability to work independently.
Language spoken: French or English.

Practical information

Duration: 5 to 6 months
Location: PIMM Laboratory, ENSAM, 151 Boulevard de l'Hôpital, 75013 Paris
Supervision: Bruno FAYOLLE and Chloé JONQUA
Internship allowance: 659,76€ / month

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