

Morphology control of isocyanate-free polymer foams for thermal insulation

Duration: 18 months (with possible extension)

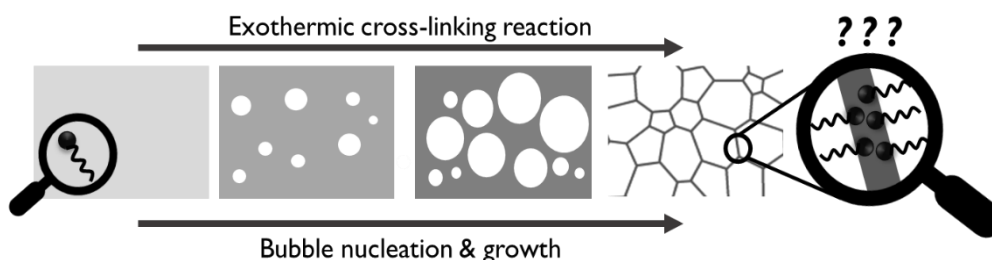
Starting date: Flexible (position available immediately)

Supervisors: W. Drenckhan & A. Hourlier-Fargette

Project summary

Isocyanate-based polyurethane foams have been successfully optimized for thermal insulation for several generations, creating an annual production of billions of tons. However, increasing environmental concerns ask not only for even better insulation, but also for less harmful formulations.

Goal of this experimental postdoc position is therefore to explore alternative, isocyanate-free formulations for the generation of new generations of thermally insulating polymer foams. We will focus on systems containing physical blowing agents which evaporate into gas bubbles during an exothermic cross-linking reaction. Of particular interest will be to separate the influence of the processing conditions and of the formulation on the final pore size and pore connectivity. For the latter, we will attempt to identify the relative importance of stabilizing agents with respect to the reaction kinetics. In order to establish the underlying mechanisms, we will combine model experiments at the scale of individual bubbles and foam films with macroscopic foam experiments, including rheology and tomography.



Context

The postdoc will take place in the team “Mechanics of Interfaces and Multiphase Systems” (MIM) at the Institut Charles Sadron (<https://www.ics-cnrs.unistra.fr/>), an internationally renowned, interdisciplinary institute of the CNRS uniting chemists, physical chemists, physicists and engineers on a wide range of questions related to polymer science and materials. The project is funded by a SOPREMA donation to the Strasbourg University Foundation.

Profile

The ideal profile for this position is that of a chemist or physical chemist who is interested to work in an international and interdisciplinary environment of chemists, physical chemists and physicists and in close interaction with an international company. The ideal candidate has experience in polymer science and in foam/interface science and an interest in working on fundamental questions arising in an applied context.

Techniques to be used

- Foaming techniques
- Interfacial tension and interfacial rheology
- Foam film measurements
- Rheology
- Tomography and electron microscopy for morphology characterization
- Mechanical and thermal analysis of foams

Application

Detailed CV (including short summary of research experience) + letter of motivation + letter of recommendation of PhD supervisor through CNRS PORTAL (<https://emploi.cnrs.fr/Offres/CDD/UPR22-WIEDRE-005/Default.aspx?lang=EN>); or to W. Drenckhan (drenckhan@unistra.fr) and A. Hourlier-Fargette (aurélie.hourlier-fargette@ics-cnrs.unistra.fr) for a first contact.