

## Viscoelasticity of polymers

ECTS	Course (h)
3	18

<b>Mention du master transmettant la fiche UE :</b>	<b>Chimie et Sciences des Matériaux</b>
<b>Composante de gestion de l'UE :</b>	<b>Faculté des Sciences – Département de Chimie</b>
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<b>Statut du responsable :</b>	<b>PR</b>

### **PRE REQUIS**

Basic concepts in Polymer Science  
Notions of Mechanics

### **PROGRAMM**

Rheology is a tool for the study of many materials, either in liquid or solid state. In the case of polymer materials, this "science of flow " occurs either:

- Through its analytical character: the viscoelastic behavior brings information about the material structure : molecular characteristics of the polymer (either by the flow behavior or around the glass transition), state of the polymer in a solvent, dispersion quality and percolation of a solid suspension, polymer blends, changing structure (cross-linking, Plastisol, crystallization,...).
- By its predictive character: Some characteristic parameters of the liquid material (polymer melt or diluted by a solvent) or evolving materials (thermosetting, plastisol ...) measured in particular conditions allow predicting the behavior in other sollicitation types. These issues are particularly useful for predicting the behavior in processing tools (extrusion, injection, extrusion, RIM...).

The objective of this course is to describe the existing experimental methods to characterize the rheological and viscoelastic behavior of materials (melt polymers, solid materials, polymers in solution, suspension solids , mixtures...). Then, the theoretical concepts to interpret this behavior in terms of the material structure will be exposed based on practical examples.

### **SPECIFIC SKILLS**

- Selecting the appropriate experimental method to characterize the viscoelastic behavior
- Interpreting the rheological curves
- Determining and analyzing the parameters of simple models.
- Choosing a material for specific applications
- Predicting the material behavior during processing.