



Séminaire PIMM

Jeudi 30 juin 2011 à 14 heures

Grand Amphi

Arts et Métiers ParisTech, 151 bd de l'hôpital, 75013 Paris

14h00

Guillaume Miquelard-Garnier

Maître de conférence CNAM

STRUCTURE – PROPERTIES RELATIONS IN SOFT ELASTOMERS: CHEMICAL AND PHYSICAL POINT OF VIEW

In this talk, I will discuss how you can define structures at different levels, from molecular to macroscopic, in polymeric materials. This “controlled building” can help to develop materials with various interesting macroscopic properties, such as mechanical reinforcement, enhanced adhesion or friction, etc.

In the first part of the talk, I will show that basic chemistry can help to create defined structures at the molecular level: in this example, we develop a new class of hydrogels with small hydrophobic clusters, leading to improved mechanical properties, both in compression and fracture.

In the second part, I will show that a simple physical phenomenon, such as a mechanical instability, can lead to the development of very well defined micro-patterned surfaces for various applications (friction, adhesion, wetting).

14h40

Alfred J. Crosby

Polymer Science & Engineering Department, University of Massachusetts Amherst

MECHANICS OF SQUISHY MATERIALS: LIVING AND NOT

We will discuss the mechanics of squishy materials, both living and not. First, we will discuss background and recent developments of a characterization technique referred to as cavitation rheology. Cavitation rheology involves studying the instantaneous expansion of a material network induced when an applied pressure at a syringe needle tip reaches a critical value. The critical pressure can be related to the elasticity or fracture properties of the polymer network, depending upon the needle radius. This method provides opportunities for studying mechanical properties in both synthetic polymer networks and biological tissues from molecular to macroscopic length scales at an arbitrary location. Second, we highlight new efforts to assemble tailored nanoparticles into materials structures that possess unique properties on both sub-10nm as well as multi-centimeter length scales. Overall, these stories will provide insight into how we think as a group and learn from Nature in the design of materials.

15h40 Café