Soutenance de thèse

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3D Time-Resolved Hetero-Coagulation of Soft Latex and Hard Colloidal Particles and the Structuration of the Resulting Gel Network

Natural rubber (NR) is an indispensable raw material used in the manufacturing of more than 40,000 products primarily due to its excellent intrinsic physico-chemical properties. However, NR is seldom used in its raw state. Often, it needs to be reinforced with particulate fillers (nanoparticles) to further improve its physical strength required for most applications. The precise origin of this mechanical reinforcement effect remains unclear, however, optimal reinforcements appears to depend on the dispersion of filler in the NR matrix and the interaction of NR and filler.

It was found that the conventional method of pouring fine powders in a solid block of rubber/melt is not the most efficient way to disperse the fillers. The new alternative approach in which the two components are first dispersed in liquid has shown promising results but available literature is still very limited. Furthermore, the microscopic mechanism involved in the interaction of NR and filler in liquid is still unknown.

In this context, we (i) described the physico-chemical surface properties of NR particles in liquid, (ii) identified key filler (size, composition, surface activity, concentration) and solution (ion valence) related parameters to comprehend the structural, morphological, and dynamical evolution of the NR-filler interaction, and (iii) quantified the mechanical properties of the NR particles.

With this approach we were able to provide the first reports on the physical processes involved in the interaction of NR and filler. More importantly, a recipe for the basic yet crucial parameters that controls and modulates NR-filler heteroaggregation was established. This could open the way to further understand the reinforcement effect.

Attention ! Jour et heure inhabituels

Mercredi 21 octobre 2015 à 13h30
Bât 210 – Amphi 1 (2ème étage)
Université Paris-Sud, 91405 Orsay Cedex

La soutenance sera suivie d'un pot auquel vous êtes chaleureusement conviés