Séminaire du laboratoire PIMM

Jeudi 19 mai 2022 à 13h30 en Amphi Esquillan

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présentera dans le cadre du séminaire leurs travaux intitulés :

Size effects in nano-reinforced polymers: hybrid modeling and experimental approach

The emphasis in the realm of reinforced polymers has been on increasing ultimate properties, such as maximum stiffness and the maximum load. Nano-reinforced materials were the answer to almost all of those questions. At the same time, the emergence of nanostructured systems raises new scientific questions ranging from materials processing to characterization of their physical behavior and appropriate modeling of their effective properties. The nano-structural-driven nature of nano-reinforced polymeric materials and which make them versatile also represents a challenge to deeply understand the nano-induced behavior. This behavior depends on a complex sequence of elementary phenomena that cross the length scales, ranging from atomic scales (Ångström) governed by QM and atomistic MD, transition through scales dominated by microstructures, and ending with the macroscale (cm and beyond) of the end-user's system. The consequence is that it is not yet possible to completely optimize technological systems based solely on engineering approaches. We must start to integrate modeling and optimization of the salient interactions into the design at each scale, to understand what impact they have on larger scales. The current experimentally-based engineering approach to developing new systems must be enriched and led by modeling, coupled with an experimental approach along with engineering system development. The general idea is to combine the best of computing, with the best expectations from the world of material science to shorten development time for new engineering systems resulting in more competitive manufacturing processes in the most high-demand emerging technology markets.

In this talk the focus will be put on two set of nano-reinforced polymers (PMMA + SiO2 and PVDF + Fe3O4 Nanospheres). The reinforcement size effects along with the interfacial interactions will be investigated toward the understanding of how these two aspects could tune the macroscopic mechanical and physical properties.