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IMCN Institut de la matière condensée et des nanosciences

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IMCN SEMINAR

« Tunable supramolecular structures : Interactions and viscoelasticity»

Wednesday 12 September 2018 – 11:00 am
Auditorium Jean-Baptiste CARNOY (B.059)
Croix du Sud 4, Louvain-La-Neuve

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ABSTRACT

Associating supramolecular systems have emerged as paradigms of functional responsive soft materials whose properties can be selectively tailored during synthesis and/or under external fields. This offers an unprecedented freedom in designing systems with desired properties. As a consequence of their internal structure, these materials have a huge disparity in length- and time-scales, which offers tunability in properties. At the same time, supramolecular living structures can serve as models for addressing outstanding challenges in soft matter physics and engineering, two of which are discussed: (i) Under some conditions, organogels can form wormlike micelles whose viscoelasticity cannot be fully described by established theories, contrary to expectations. This longstanding problem is partly solved by showing the dramatic influence of humidity in such structures via competing hydrogen bonding. The consequences of this important effect are far-reaching. (ii) Telechelic star polymers represent ideal building blocks for different soft patchy superstructures, which have been studied extensively by means of simulations. Here, an experimental protocol is presented for exploring the rich state behavior of these systems. The solid (gel), liquid and re-entrant states of these systems, obtained upon changing the strength of attractions, bear unique viscoelastic signatures and reflect the ability to tune properties at wish.

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BIOGRAPHY

Dimitris Vlassopoulos is Professor at the Department of Materials Science & Technology, University of Crete (Heraklion, Greece) and at the Institute of Electronic Structure & Laser (FORTH, Heraklion, Greece). His Research focuses on molecular engineering of soft matter with emphasis on fundamental aspects of polymer and suspension rheology as well as bridging the gap between these two disciplines. The key elements of his approach include (i) the molecular design and methodological investigation of model systems with controlled or adaptable molecular weight and structure (architecture) and/or with tunable interactions (from hard to ultrasoft), and (ii) instrumental advances in rheometry vis. a vis. nonlinear response. Recent topics include the viscoelasticity of entangled ring and comb polymers and their mixtures with linear chains, glass and jamming transitions in soft colloidal composites, tunable supramolecular assemblies and rheology of confined macromolecular systems.

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