Secteur des Sciences
et Technologies

Invitation à la soutenance publique de thèse de

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M. Tech. (Chemical Synthesis & Process Technologies)

Pour l'obtention du grade de Docteur en sciences

« Controlling the ring mobility in palladium-based slide-ring gels »

qui se déroulera
le jeudi 11 mars 2021 à 14h
En visioconférence
1348 Louvain-la-Neuve

Jury members :

Prof. Charles-André Fustin (UCLouvain), supervisor
Prof. Evelyne van Ruymbeke (UCLouvain), supervisor
Prof. Yann Garcia (UCLouvain), chairperson
Prof. Michael Singleton (UCLouvain), secretary
Prof. Patrice Woisel (UDL, France)
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A mechanical bond is not shared between atoms but instead develops between molecular entities entangled in space. The molecules resulting from a mechanical bond are called mechanically interlocked molecules (MIMs), and the most common MIMs are catenanes and rotaxanes. These mechanically interlocked structures have been exploited in a wide range of research fields, in particular molecular machines and polymeric materials such as slide-ring gels. Slide-ring gels are cross-linked polymer networks where which have mobile cross-links made of linked macrocycles in a figure-of-eight motif, each having a polymer chain passing through its cavity. The aim of this work is to study the influence of the ring mobility on the network properties by changing the strength of the interaction between the ring and the polymer chain passing through it. Initially, a palladium-based metal-ligand interaction is present between the ring and the polymer chain, preventing the ring mobility. By removing the palladium ions, the rings are freed, allowing their mobility, which further depends on the solvent used. Thus, by using a single system, three degrees of ring mobilities, from immobile, to partially mobile, to completely free, can be achieved without changing other network parameters. Palladium-based slide-ring gel systems were obtained by two different approaches: the polyrotaxane approach and the one-pot approach. In the polyrotaxane approach, a polyrotaxane is first synthesised and then cross-linked to form the slide-ring gel, while in the one-pot approach, a gel is directly synthesised by using a tetra functional bis-pseudorotaxane as cross-linker. The synthesised slide-ring gels, in solvents of different polarities, were further studied by rheology to observe the effect of ring mobilities on the dynamics of the networks. Finally, stretchability tests evidenced the very large deformability of these materials.