Université catholique de Louvain UCL SECTEUR DES SCIENCES ET TECHNOLOGIES

Institut de la Matière Condensée et des Nanosciences

Invitation à la soutenance publique de thèse

Pour l'obtention du grade de Docteur en Sciences

Monsieur Elio POGGI

Master en sciences chimiques à finalité spécialisée

Use of self-assembled block copolymers to synthesize asymmetric nanoparticles

Janus particles, named after the doubled faced roman god of the same name, are a class of particles characterized by an asymmetric structure with two or more surface regions exhibiting different properties. This broken symmetry gives rise to unique properties, such as the ability to have directional interactions and a great affinity for interfaces, which make these particles potentially useful in a wide range of applications, including chemical and biological sensors, phase transfer agents, switchable devices, drug carriers, emulsion stabilizers and others. In this context, the ability of block copolymers to self-assemble into well-defined nanostructures makes them very interesting building blocks for the synthesis of such nanosized particles. However, even if great progresses have been made during the last decade, the synthesis of Janus particles from block copolymers still presents some challenges and dedicated strategies are often required to break the symmetry and yield asymmetric particles.

In this thesis, different strategies to produce well-defined polymeric Janus nanoparticles using block copolymer thin films as precursors are investigated. The first one involves the alignments of the cylindrical domains of two superposed block copolymer thin films made from different diblock copolymers having a common minor block. The formation of asymmetric nanoparticles after selective cross-linking of the cylindrical domains and dissolution of the film is then studied. In the other strategies, a homopolymer is selectively grafted, either through "grafting to" or "grafting from", onto the cross-linked cylindrical microdomains of a block copolymer thin film. Since the grafting occurs only on top of the microdomains, well-defined and asymmetric Janus nanoparticles are obtained after dissolution of the grafted thin film. The use of nanostructured thin films allows a good control over the size of the final nanoparticles since both the microdomain size and the thickness of the film are well-defined. Another potential advantage of our strategies is also their compatibility with a relatively large range of different polymers, hence allowing the synthesis of particles with various properties.

Mardi 2 mai 2017 à 15h00

Auditoire LAVO 51
Bâtiment Lavoisier
Place Louis Pasteur, 1
1348 Louvain-la-Neuve

Membres du jury :

Prof. Jean-François Gohy (UCL), promoteur
Prof. Yann Garcia (UCL), président
Prof. Sophie Demoustier (UCL), secrétaire
Prof. Filip Du Prez (Universiteit Gent)
Prof. Charles-André Fustin (UCL)
Prof. Olivier Riant (UCL)