

Invitation à la soutenance publique de thèse

Pour l'obtention du grade de Docteur en Sciences de l'Ingénieur

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Master en Science et ingénierie des matériaux

**Temperature dependence of volume and surface properties of
thermo-and photo-responsive polymer bueshes**

This work focuses on the temperature-dependent volume and surface hydrophilicity of dense polymer brushes. Hydrophilicity refers to the affinity of water for polymer molecules, represented by the swelling degree of the brush in water (volume hydrophilicity) or by a contact angle of water on the brush surface (surface hydrophilicity). For practical applications, a finer understanding of volume and surface hydrophilicity of polymer brushes is needed.

In this work, the volume and surface hydrophilicities of several representative homopolymer brushes, including thermo-responsive brushes, are first studied, revealing that both the surface and volume hydrophilicities of hydrophilic homopolymer brushes vary little with temperature. As for thermo-responsive polymer brushes, they display a gradual but strong decrease of swelling with temperature, before reaching full collapse. In contrast, their surface hydrophilicity changes very marginally over the same range of temperature.

Copolymerization between highly hydrophilic monomers and monomers comprising functional groups affords a range of brushes with continuously-varying properties; by grafting photochromic azobenzene onto functional monomer units, photo-responsiveness ensues. The volume and surface hydrophilicities of such photo-responsive copolymer brushes are then measured. Volume hydrophilicity can be tuned by changing composition or by grafting azobenzene; however, photo-irradiation affects marginally volume and surface hydrophilicities. We discuss these results based on the dynamical reorganization of chain segments at the brush/water interface, and the reorganization of water structure in the volume of the brush.

Jeudi 10 novembre 2016 à 15h00

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



Membres du jury :

Prof. Alain Jonas (UCL), promoteur
Prof. Karine Glinel (UCL), promoteur
Prof. Jean-François Gohy (UCL), président
Prof. Christine Dupont (UCL), secrétaire
Prof. Dominique Hourdet (Université Pierre et Marie Curie, Paris 6, France)
Dr. Ali Dirani (Dätwyler Pharma Packaging, Alken, Belgique)