

Séminaire



Lundi 23 janvier 2023 à 10h30
Amphithéâtre Henri Benoît et visio

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Responsive hydrogel films: design and functionalities

Smart or switchable materials by means of synthetic **stimuli-responsive polymers** have gained much attention owing to their potential applications from sensors to actuators. Surface-attached hydrogel films are actual novel alternative to brushes and layer-by-layer assemblies as polymer coatings. They are multifunctional and multiscale materials with thickness widely ranging from **a few nanometers to several micrometers**. We have developed a simple and versatile approach to fabricate reliable and reproducible surface-attached hydrogel films on plane solid substrates. Surface-attached hydrogel films show very interesting **responsive properties**: they reversibly modify their thickness with temperature by absorbing/expulsing water with high amplitude change (the change is four-fold or more); the transition is sharp and rapid (within a few degrees around the transition temperature and below one second); hydrogels with adjustable internal architectures can be built such as multilayer hydrogel films, nanocomposite hydrogel films, micro-patterns of hydrogels.

This platform of surface-attached hydrogels with well-controlled chemistry allows to face new challenges in various areas. This new approach of polymer thin layers makes possible fundamental studies such as a fine characterization of mechanical properties of hydrogel films in water: **wetting, underwater friction and adhesion**. We also showed that temperature-responsive hydrogels have excellent performances as micro-actuators. Responsive hydrogels embedded inside **microfluidic devices** operate as functional gates or valves which are reversibly open/close for fluid flows, allowing the development of cheap and handy lab-on-a-chip. The caging functionality for encapsulation is very promising for biotechnological applications. Responsive hydrogel films are also suitable for the development of **modulable optics**.

Les personnes souhaitant rencontrer Yvette Tran sont priées de prendre contact avec Delphine Chan-Seng.

References:

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- Dompé, M.; Cedano Serrano, F. J.; Heckert O.; Tran, Y.; Hourdet, D.; Van den Heuvel, N.; Van der Gucht, J.; Creton, C.; Kamperman, M. Thermo-responsive complex coacervate-based underwater adhesive. *Adv. Mater.* **2019**, *31*, 1808179.