Séminaire

INSTITUT Charles SADRON
CNRS - UNISTRA - STRASBOURG

Mardi 21 novembre 2023 à 10h30

Amphithéâtre Henri Benoît et visio

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Molecular Programming of Materials Using DNA

The defined sequences of biomolecules (peptides, DNA, glycans…) drive their self-assembly into a mesmerizing diversity of functional materials. Our difficulties to produce sequence controlled macromolecules, limits our capacities to reproduce the performances of biological materials. Decades of progress in molecular biology overcame some of the challenges associated with the synthesis of sequence-controlled DNA strands. In this seminar I will give a quick overview of the strategies available to build upon this progress and to program the behaviour of synthetic materials using DNA (Fig.A). I will illustrate the potential of DNA for material programming with two of our recent work. First, I will show how to use DNA to design dynamic hydrogels inspired by vitrimers that reorganize via an associative exchange mechanism (Fig B). Then, I will present the design of mechanofluorescent hydrogels (Fig. C). In both examples I will show how sequence control allows one to control macroscale material properties.

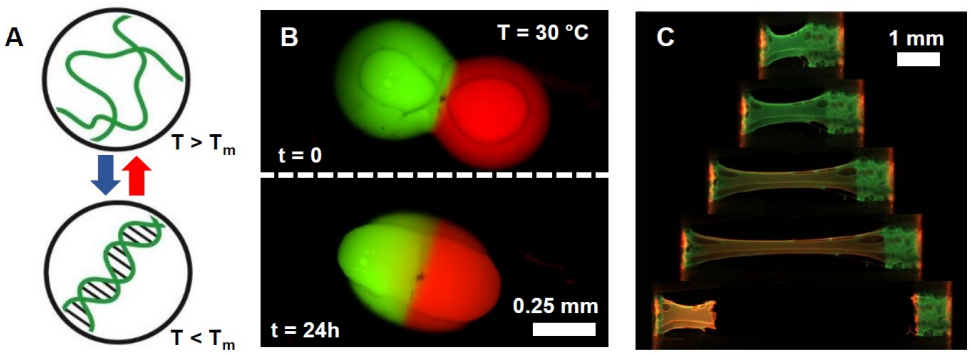

Figure: (A) Schematic representation of DNA melting. (B) Melding of dynamic DNA hydrogels. (C) A mechanofluorescent DNA hydrogels that becomes red under stress.

References:

R. Merindol, A. Walther, *Materials Learning from Life: Concepts for Active, Adaptive and Autonomous Molecular Systems.* Chem. Soc. Rev. (2017).

R. Merindol, S. Loescher, A. Samanta, A. Walther. *Pathway-controlled formation of mesostructured all-DNA colloids and superstructures.* Nat. Nanotechnol. (2018).

R. Merindol, G. Delechiave, L.H. Catalani, A. Walther, *Modular Design of Programmable Mechanofluorescent DNA Hydrogels.* Nat. Commun. (2019).

Les personnes souhaitant rencontrer R. Merindol sont priées de prendre contact avec Antonio Stocco.