Séminaire

Vendredi 14 novembre 2025 à 10h00

Amphithéâtre Henri Benoît

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Nanocellulose Thin Films :

A versatile platform for generating optical, conductive and electromechanical properties

Cellulose is an abundant, renewable and non-toxic polymer used in countless materials notably in the form of nanocrystals (CNC) or nanofibers (NFC). These nanoparticles exhibit good colloidal stability and acicular morphology, completed by self-assembly properties or interaction capacities with different polymers or other nanoparticles. In this presentation, elaboration of nanocellulose-based thin film displaying optical properties, electrical conductivity and piezoelectric and flexoelectric effects will be presented. The first type of thin film was produced by a layer-by-layer process generating structural colors. These films are sensitive to enzymatic hydrolysis, which leads to a change in color allowing easy and fast enzymatic activity detection. [1-4] The second type of thin film presented consists of CNCs associated with carbon nanotubes (CNT). Cellulose nanocrystals can disperse CNT in water under the action of ultrasound, forming CNC-CNT complexes that were incorporated into multilayered films, which showed electrical conductivity. [5-7] The last category of films presented was made from chemically modified NFCs and cellulose fibers. We investigate the electromechanical coupling of films to separate the flexoelectric and piezoelectric contribution. [8]

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2. Cerclier, C. et al. *Advanced Materials* **2011,** *23* (33), 3791-3795.
3. Cerclier, C. et al. *Biomacromolecules* **2013,** *14* (10), 3599-3609.
4. Guyomard-Lack, A. et al. *Eur. Phys. J. Spec. Top.* **2012,** *213* (1), 291-294.
5. Olivier, C. et al *Journal of Renewable Materials* **2018,** *6* (3), 237-241.
6. Olivier, C. et al *Langmuir* **2012,** *28* (34), 12463-12471.
7. Mougel, J.-B. et al *Journal of Physical Chemistry C* **2016,** *120* (39), 22694-22701.
8. Trellu, H. et al *Carbohydrate Polymers* **2023,** *321*.

Les personnes souhaitant rencontrer B. Cathala sont priées de prendre contact Olivier Felix.