

Postdoctoral position: Coupling molecular motors to nanocelluloses

INRA Biopolymères, Interactions et Assemblages, Nantes (France)

Postdoctoral position: two years

Starting date: February-May 2018

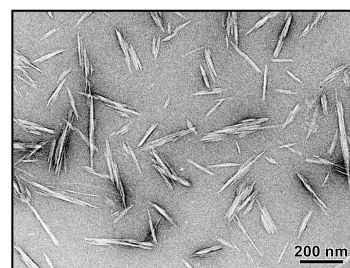
Employer: INRA

Workplace: Biopolymers, Interactions and Assembly (UR 1268 INRA), Nanostructured Assemblies team

Objectives of the postdoctoral position:

This postdoctoral position corresponds to the fabrication of mono and multi motor-modified cellulose nanocrystals capable of performing nanomolecular work.

Cellulose nanocrystals (CNC) are nanometer-size rigid crystalline rods obtained from cellulose fibers by acid hydrolysis. The presence of a high number of hydroxyl groups and C-H bonds leads to the formation of intra and intermolecular strong hydrogen bonds and van der Waals interactions. This self-association provides unique properties such as strengthening effect, good mechanical and barrier properties as well as transparency and low thermal expansion.



In this project we aim to selectively introduce chemical moieties on the surface of cellulose nanocrystals. As chemical functionalities we will explore (macro)molecules capable of responding to external stimuli that control CNC movement and arrangement. The objective is therefore the fabrication of nanomolecular machines consisting of molecular motors (molecules that develop molecular work under external stimuli) coupled to cellulose nanocrystals (that will act as the “arms” of the nanomachines).

The fellow will modify cellulose nanocrystals, and he/she will characterize them. Characterization will involve the detection of the motor within the cellulose structure. He/she will also focus on the application of the assemblies nanocellulose-motor, the evaluation of cellulose nanocrystals motion, and the exploitation for the development of applications.

Workplace:

This postdoctoral position will be developed at the Biopolymers Interactions and Assemblies (BIA) unit from the National Institute for Agricultural Research (INRA) located in Nantes (France), more precisely in the Nanostructured Assemblies (Nano) team under the supervision of Ana Villares. Nano team focuses on the preparation of materials/arrangements with biopolymers from agricultural sources and the structural characterization of such nanostructures. The main research question deals with the structuration of elementary biobricks at nano and microscale in order to develop new properties (optical, transfer, controlled delivery, biological, etc.).

National Institute for Agronomical Research

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Skills required / Candidate profile:

We look for a candidate having a strong team working ability, with a PhD in Chemistry or related. The fellow should have expertise in Chemistry, chemical synthesis, and common characterization techniques in Physics and Nanotechnology (FTIR, UV-vis spectroscopy, NMR, EA) as well as specific techniques for the study of nanocelluloses (microscopy, AFM, TEM, Conductometry, DLS, X-Ray, birefringence, etc.).

Application details:

Application deadline: 15th January 2018

Application procedure: Send a brief CV (maximum 2 pages) and a cover letter to Ana Villares (ana.villares@inra.fr) including two references for possible recommendation.