

Post-doctoral position for 18 months to start end 2017 in Nantes (F)

Cellulose/silver hybrides nanoparticules for biocide activity

Biocides are used in a very large variety of daily products, in particular in drugs, cosmetics or paintings. However, the use of organic biocides, such as parabens and isothiazolons, induces more and more identified problems. In this context, mineral biocides such as silver nanoparticles might be of high interest if produced in a highly controlled way.

Cellulose is a biobased product composed of chains of glucose. Biocompatible and biodegradable, it appears as fibers that can be dissociated into semicrystalline structures of nanometric section. The BIA unit in Nantes works on the characterization of such nanoparticles for years. Nanocelluloses are not reactive in surface but constitute a substrate of choice for a broad range of functional groups for various applications such as optics, electronic, catalytic... In particular, former work showed that the hydroxyl groups exposed can react with inorganic metals such as the Ag⁺ ions.

The objective of this project is to develop sustainable hybrid nanomaterials following a “safer by design” approach, so that the exposure and hazard risks are minimized without compromising their function efficiency. In this context, this project aims to create organic-inorganic hybrid nanostructures for which the cellulose constitutes a substrate on which silver is grafted in an extremely controlled way for an optimal release of Ag⁺ ions. This study will be carried out in collaboration with experts in toxicology and formulation through partners laboratories.

Techniques: The post-doc will use the instruments available at BIA and on the BIBS platform at INRA for characterization of which microscopies (MET, confocal microscopy, AFM), X-ray diffraction, NMR, nanosizer, conductimetric titration, zeta potential measurement and all other technics in nanotechnology available at academic partners of the Laboratory of Excellence SERENADE.

Context: This project located in Nantes will take place within the framework of laboratories of excellence, Labex SERENADE (Safe(r) Ecodesign Research and Education applied to Nanomaterial Development) in close collaboration with teams dedicated to the nanotechnology, chemistry and toxicology for the implementation of films and painting. The candidate will thus investigate the preparation and characterization of these hybrid nanoparticles for fundamental research development but also will interact with partners for application.

Required profile: Physicochemist or chemist of polymers, knowledge in polysaccharides is appreciated.

Practical information: This project will be located at INRA in Nantes. The candidate has to provide a CV with a motivation letter and references before 31st of October. To apply and for any information contact by e-mail: isabelle.capron@inra.fr or tel: 02 40 67 50 95.