

'Physique et Chimie des Matériaux' – ED 397 – année 2020

PhD project for funding (max 1p), to send to

nadine.witkowski@sorbonne-universite.fr under PDF form « [acronyme labo_nom encadrant.pdf](#) »

Research unit (full name + acronym) : Laboratoire de Chimie de la Matière Condensée de Paris - LCMCP

Team if applicable : SMiLES

Address : 4, Place Jussieu 44-54, E4

Supervisor name (HDR) : Niki Baccile

Position : Researcher CNRS

Tel 0144275677

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Number of PhD under supervision : 1

Participation to supervisor training? no Year

Co-supervisor name : Prof. Eero Kontturi

HDR ? yes

Research unit : University of Aalto (Finland)

International co-supervision ? Yes

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Keyword 1 : Soft Matter

Keyword 2 : Biosurfactants

Keyword 3 : Nanocellulose

Keyword 4 :

Select co-funding programme if applicable : Other

France/Finland PhD

Project title : Biosurfactants and Cellulose Nanocrystals Soft Materials

Project Description (~4000 characters, font 11 min):

Cellulose nanocrystals (CNCs) and chitin nanocrystals (ChNCs) are rigid nanorods of crystalline polysaccharide that possess a wide application potential in fields as diverse as composites, cosmetics, sensor materials, catalysts and even oil drilling. They belong to a vast family of biologically, sustainable, derived nano-objects that play a significant role in, for example, replacing plastics in a more sustainable future environment. There are, however, major challenges involved with CNC and ChNC dispersion that render them an unrealistic commercial choice at the moment. These may appear as engineering challenges to a casual observer but with a closer look, they are essentially scientific problems that require fundamental research for truly sustainable solutions and which so far present the development of truly green CNCs soft Materials.

The goal of the project is to develop a joint strategy between Sorbonne University (Paris, France) and Aalto University (Helsinki, Finland) to tackle the problem of dispersing CNCs and ChNCs and develop new cellulosic soft materials. We will employ biobased, green, self-assembled dispersants: biosurfactants. Interactions between biosurfactants and CNCs and ChNCs, and the resulting green soft materials, are unknown and will be studied in details using the most up-to-date tools like Quartz Crystal Microbalance, Transmission Electron Microscopy, Rheology, Small angle X-ray Scattering, among others.

The candidate must attend a Master 2 course in materials chemistry, materials science, chemistry or physics.

Additional information

- The project will be in a formal cotutelle between Sorbonne university and Aalto University (double diploma).
- It is required that the PhD candidate will spend at least 1 1/2 at Aalto University.
- Cofinancing (30 k€) will be asked to the France/Finland Cotutelle Grant through the Niilo Helander Foundation PhD grant and the Maupertuis PhD grant (Deadline March 15th). More info at: france.fi/helsinki/ev-sciences-et-universites/francefinland-phd-cotutelle
- Additional financing of 10 k€ will be granted by the Finnish partner