3 years PhD position

Centre for Materials Forming (CEMEF) of Mines ParisTech, Sophia Antipolis, France

Understanding phase transitions in bio-gels for structure/properties control of bio-aerogels and for making responsive biomaterials

Project description

Hydrogels based on stimuli-responsive synthetic polymers are an essential building block of smart materials and devices, and have been actively studied in the past several decades targeting at applications as biointerfaces, coatings, sensors, for controlled drug delivery, tissue engineering, and as various types of actuators. Much less is known about stimuli responsiveness of gels from natural polymers, here, polysaccharides ("bio-gels" in the following). Can bio-gels replace "intelligent" petrol-based gels and suggest new applications of polysaccharides?

The goal of this PhD project is to understand and quantitatively describe phase transitions in polysaccharide gels in non-solvents and their mixtures. In addition to the fundamental scientific importance of this topic in the area of soft matter science, such a description will help the development of the following applications: i) controlling bio-aerogel properties and ii) making bio-based sensors. Bio-aerogels are new biomass-based lightweight nanostructured materials with strong potential in life science applications. Another very promising application of bio-aerogels is thermal insulation.

The work is at the frontier of polymer chemical physics and materials' processing. It will involve the use of various approaches and techniques such as formulation, rheology, 3D printing, optical and electron microscopies, characterisation of solutions, blends and porous materials.

The work will be performed in CEMEF in collaboration with Hamburg Technical University (Germany). CEMEF is world leader in the development of biomass-based materials, in particular, in bio-aerogels. This PhD project is funded by French National Research Agency (ANR).

Keywords: hydrogels, polysaccharides, solutions, rheology, gels, bio-aerogels.
Skills: knowledge in polymer chemical physics, capability to work in group, fluent in English, mobility, motivation and sense of initiative and capability to report regularly on his/her work.
Duration: 3 years
Gross annual salary: about 26 k€/year.
The position is available now (as soon as possible).

Application:
The position is for a student with Master degree.
Please send your CV, motivation letter, your marks from the last two years and two emails of a reference person to Tatiana Budtova, CEMEF, email : tatiana.budtova@mines-paristech.fr

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