3 years PhD position

Centre for Materials Forming (CEMEF) of Mines Paris-PSL, Sophia Antipolis, France

Sustainable upcycling of cellulose-based textile waste using all-cellulose composite approach

Project description

The global demand for textile products is steadily increasing. In addition, «fast fashion» trend decreases the lifetime of textiles. 75 million tons of textile are used, and only a few per cent of the overall textile waste flow is recycled. Among all type of textiles, about 30% contain cellulose fibers, either alone or mixed with other types of matter. Only about 15% of textile are recycled, and only about 1% is up-cycled mainly focused on spinning cellulose fibers.

New technologies and approaches are needed to offer other ways of waste textiles' recycling and making high added-value materials. The PhD project is part of a large national program focused on recycling, in particular, on reduction of the environmental footprint of textiles.

The goal of the PhD project is to design and develop new materials for the upcycling of cellulose-based textiles using "all-cellulose composites" approach. Cellulose-based waste textiles involving cotton, flax, viscose, Tencel, polycotton will be used. New ways to produce textile-based materials of various properties, shapes and aesthetics, also using low environmental impact processes, are expected as project outcome.

The work is at the frontier of polymer chemical physics and materials' processing. It will involve the use of various techniques, including formulation, rheology, optical and electron microscopies, characterisation of solutions, blends and porous materials, 3D printing, understanding the kinetics of cellulose dissolution and its correlation with material properties.

The experimental work will be performed in CEMEF/Mines Paris-PSL. CEMEF is world leader in the development of biomass-based materials, in particular, based on cellulose.

Keywords: textile, solutions, blends, composites, rheology, gels, 3D printing
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 from October 2025.

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, email : tatiana.budtova@mines-paristech.fr

CEMEF/Mines Paris : rue Claude Daunesse, Campus Pierre Laffitte, CS 10207, 06904 Sophia Antipolis, France