

## **PhD Position in Polymer Chemistry and biobased derivatives**

**Project title : FUranic TUnable REsins for Sustainable materials**

**Location : Institut de Chimie de Nice (UMR 7272), Eco-friendly Materials Group, Université Côte d'Azur, Nice - <http://univ-cotedazur.fr/labs/icn/fr/equipes/materiaux-et-polymeres-eco-compatibles/>**

Research in the frame of the JCJC "FUTURES" project from the French National Research Agency (ANR).

### **Description of recruiting organization**

The ICN (website: <http://univ-cotedazur.fr/labs/icn/fr>) is a joint research laboratory between CNRS (UMR 7272) and University Côte d'Azur. The ICN has an internationally recognized expertise in molecular chemistry, catalysis, green chemistry, analytical chemistry, molecular design, biomass derived materials and valorization of monomer/polymer from biomass into new commodity materials; kinetics of polymerization/phase transitions, thermo-mechanical characterization, polymerization mechanisms.

### **Project description**

The transition to greener and more sustainable products is an important societal challenge. A worldwide global task force has been implemented by the United Nations between local and regional government to define sustainable development goals (SDG) for 2030. The FUTURES project fit perfectly with the goal 9 of this roadmap which aims at "increasing resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes".

In this line, biorefinery processes have emerged in the past decades to generate chemical building blocks from lignocellulosic biomass that can be further transformed into functional polymers. The biorefinery operations can lead to furanic molecules which are obtained from various constitutive sugars of vegetable biomass. Different biobased polymers, both thermoplastics and thermosets, can be prepared from these furanic monomers. This is the case of Polyfurfuryl Alcohol (PFA) which is one of the rare available biobased thermosets. The biorefinery processes also produce co-products such as humins which have a polyfuranic structure and they need to find pathways of valorization. Both PFA and humins are characterized by a very dense cross-linked network which is a drawback for designing versatile macromolecular architectures.

The thermal and mechanical behavior of new biobased polymers is probably one of the most important issues since it drives their processing, their life as well as their end of life. To achieve this goal the FUTURES project aims at tailoring the cross-link density of these furanic resins (both PFA and humins) to obtain new furanic thermoset-like resins with tunable thermo-mechanical properties obtained from structural modifications.

The PhD candidate should have good backgrounds in analytical chemistry (FTIR, NMR, MS, thermal analysis, mechanical analysis,..) and polymer chemistry or organic chemistry. Knowledge in biomass valorization or biobased polymers would be a plus.

**Project partner** : different academic partners in France and Europe will be involved, especially for helping in the characterization of the newly formed furanic resins. The PhD fellow will also have the opportunity to participate in networking and training activities of the COST Action "Fur4Sustain".

**Scientific skills** : Organic Chemistry, Polymer chemistry, thermal and mechanical properties of polymers, structural characterization of polymer and composite/nanocomposites.

**Duration**: 36 months; the recruitment date is 1st September 2020

**Application**: please provide a CV with list and the name/contact details of two reference persons (e.g. internship supervisors, etc.).

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