



PROPOSAL of CALL
for ASSIGNMENT of a PhD RESEARCH GRANT
“Development of sustainable nanofibrous materials from bacterial
polymers and biobased waterborne latex”

within the scope of the UNITA PhD Cotutelles: 2021

**This program has received funding from Agence Nationale de la recherche,
France**

It is open a call for a Research Doctoral Grant, within the scope of the UNITA PhD Cotutelles 2021, funded by the Agence Nationale de la recherche, France, taking place at the Université de Pau et des Pays de l'Adour (France) and the University of Beira Interior, Covilhã, Portugal.

UNITA is an alliance of six Romance-language speaking universities located in rural and cross-border mountain areas. It is constituted of the Universidade Beira Interior (Portugal), Universidad Zaragoza (Spain), Université de Pau et des Pays de l'Adour (France), Université Savoie Mont Blanc (France), Università di Torino (Italy, coordinator), and Universitatea de Vest din Timisoara (Romania), gathering more than 165,000 students and 13,000 staff members (<http://univ-unita.eu>).

One of UNITA's goals is develop Research and Innovation activities in each of the alliance's thematic areas.

To Promote these research activities, 1 cotutelle PhD grant has been awarded to research project in Circular Economy that involve a French research team (at Université de Pau et des Pays de l'Adour, UPPA) and another partner university of the alliance, in this case with a Portuguese research team (at Universidade Beira Interior, UBI).

1. Scientific Area:

Materials Science, Polymer-Chemistry, Biotechnology.

2. Activity objectives

Develop the PhD plan entitled “Development of sustainable nanofibrous materials from bacterial polymers and biobased waterborne latex”.



3. Admission Requirements:

- Master degree in Materials Science, Biotechnology, Textile Technology or Engineering, Chemistry, Biochemistry, Environmental technologies, or other related.
- Be a student enrolled in a cycle of studies leading to a doctorate degree UPPA and UBI (Cotutelle).
- Citizens of all nationalities are eligible to apply
- Entrance requirements: candidates must hold a Master's degree (or equivalent degree) with outstanding records

4. Work plan:

The PhD project will pursue the following research objectives divided into 4 fundamental tasks:

1. Develop novel biobased waterborne polymer latex and high performance nanofibers with reduced impact on environmental and finite resources. This PhD project will make progress in the development of environmentally friendly biobased waterborne latex by implementing an in-depth study of the emulsion polymerization process for biobased monomers and emulsifiers with suitable structures. Providing solutions to the double substitution of harmful and fossil resource-based chemicals with less toxic and more sustainable biobased materials is at the heart of the project. This task will be supervised at IPREM (UPPA) by Dr. Maud Save (expertise in Polymer chemistry, emulsion polymerization, biobased polymers).
2. Design the best conditions for bacterial production of natural exopolysaccharides (Bacterial cellulose and kefiran) via fermentation. Being our aim to also evaluate residues aligned with the Goals 12 and 15 (UN 2030 Agenda), we intend to select appropriate feedstock from the inner region of Portugal. Accordingly, several species were identified and biorefining will follow multistep processing. Short-fermentation will be used to obtain the polymer nanowhiskers to be further processed in the electrospinning. This Task will be supervised at UBI by Dr. Isabel Gouveia at FibEnTech research Unit and Textile Science and Technology Department at UBI (expertise in fibrous materials, bioactive functionalities, antimicrobial coatings and microbiology growth).



3. Optimize the electrospinning process conditions for the production of nanofibrous structures employing different blends of the fermented polymers and biobased waterborne latex. By using nanowhiskers resulted from short-fermentation they have a great potential to be further transformed in nanofibrous via electrospinning technology. This Task will be supervised at UBI where the Electrospinning equipment (Nanospider from ElMarco) is available, by Dr. Isabel Gouveia, but with the close collaboration of Dr. Maud Save due to her expertise in emulsion polymerization and biobased polymers.

4. Establish robust structure-properties relationships of biobased polymer nanofibrous materials. This task will be performed at UBI by the supervision of Dr. Isabel Gouveia. The properties and performances of the polymer membranes prepared from nanofibrous materials will be thoroughly characterized: regarding the surface morphology, physicochemical, and mechanical properties. The biobased waterborne latex used as additives in the formulation will be valuable to tune mechanical properties of blends with bacterial polymers. Indeed, by suitable choice of comonomers, the glass transition temperature of biobased polymer can be tuned. Biological assets will be also evaluated.

5. Place of Work: The work will be developed at the premises of:

Université de Pau et des Pays de l'Adour (UPPA), IPREM UMR5254– Department Physico-chemistry of surface and polymer materials (PCM), Pau, France, under the scientific guidance of Dr. Maud Save, and FibEnTech Research Unit and Department of Textile Science and Technology of the University of Beira Interior, Covilhã, Portugal, under the scientific guidance of Dr. Isabel Cristina Aguiar de Sousa e Silva Gouveia.



6. Duration and activity regime¹

The grant has a duration of consecutive 36 months, starting on September 2021. The grant may not exceed the end date of the project.

8. Amount of the monthly maintenance allowance:

The Amount of the monthly maintenance allowance of the scholarship corresponds in accordance with UNITA and funding from Agence Nationale de la recherche, France, **to the amount of € 1350, with other diverse allowances for mobility, conferences.**

9. Selection methods:

Upon reception of all application forms, a committee composed of the two Cotutelle supervisors Dr. Maud Save and Dr. Isabel Cristina Aguiar de Sousa e Silva Gouveia and a representative of the doctoral school of the two partner universities, will take care of the process which will be divided on two phases:

- 1) Selection on the applicant form
- 2) For those who have been selected on the first step, Remote interview.

10. Application documents:

Composition of the application form.

IMPORTANT: The application must be in English and uploaded in PDF format. Only complete

applications will be taken into consideration.

The Application Form should contain all the following mandatory documents:



1. A full CV (Template provided) that includes all personal information, education background, research activities (if any) and information about two referent persons.
2. Two Reference letters (in a single PDF file): each referent person will submit a letter concerning the applicant's previous research activities and the applicant's research capacity and working experience.
3. A personal statement (maximum of 3 pages – no template – free writing) that includes a Personal introduction, Qualifications and achievements, Career development objectives, Activities envisaged to enhance academic profile, Collaboration opportunities planned beyond the higher education sector, General motivation for participation in the program.
4. A copy of the Master degree diploma or equivalent translated into English; for candidates with a Master's degree in progress during the academic year of the call, marks and rankings corresponding to the first semester of the Master.

13. Application and deadline

The call is open from 29 June 2021 to 12:00 a.m. (French hour, 11.00 a.m. in Portugal) of 15th July 2021. Applications must be formalized, as follows:

In order to apply to the call, applicants must comply with the following requirements.

1 - Registration on the application platform.

First of all, the candidate must go to <https://aap-e2s.univ-pau.fr/> , click on the appropriate call CIRCULAR ECONOMY – CALL: **“Development of sustainable nanofibrous materials from bacterial polymers and biobased waterborne latex”** , UNITA Cotutelle 2021, and register his/her profile.

To go further in his/her application, he/she must check that his/her meets the eligibility criteria described.

2 – Completing the submission form; 3 – Finalize submission; 4 – Check application confirmation by e-mail.

More detailed information can be found in <https://aap-e2s.univ-pau.fr/> and <https://aap.univ-pau.fr/siaap/pub/appel/view/180>