

Part I: General introduction

In the last decade, lightweight fibre-reinforced composites have allowed the sustainable development of modern society by, for example, enabling more efficient wind turbines and making our vehicles lighter. Unfortunately, these materials are challenging to recycle: most composite parts are still incinerated or landfilled, two very polluting practices.

The FibReLoop project is a Marie Skłodowska-Curie (MSCA) Doctoral Network that aims to promote the industrial implementation of circular economy strategies for composites. Fourteen doctoral candidates will be trained to tackle the recycling of a composite part all the way to the design and production of new recycled components. The topics include the evaluation, enhancement, and development of current and new recycling technologies; the experimental assessment of the behaviour of the recycled materials; the development of material models and design approaches for recycled composites and parts; and the implementation of recycled composites and circular economic practices into real-life industrial cases. FibReLoop involves 18 European universities and companies.

Applications are invited for fourteen PhD positions in the field of recycling of composites, leading to the award of a PhD degree. The recruited researchers will be trained for 3 years to become interdisciplinary and multi-talented experts. They will develop advanced simulation tools to predict optimal microstructures for recycled composites, manufacture these microstructures and then verify them in industrial applications. The researchers will have a unique opportunity to be trained by world-leading experts in cutting-edge technologies, supported by a strong network and extensive industry participation.

Please note that some of the positions are hosted by an industrial partner. In this case, the researcher will also be enrolled in a PhD program at a university.

Part II: Detailed description of individual positions

Title of the position: Composite recycling via High-Voltage Fragmentation: experimental and modelling analysis

Host organization (country): Politecnico di Milano (Italy)

Duration: 3 years

Description

The key challenge of this PhD project is to explore, optimize and model the recycling of composite materials through the innovative technology of High-Voltage Fragmentation (HVF). The work will be performed at the Department of Mechanical Engineering of the Politecnico di Milano (Italy). You will be supervised by Prof. Marcello Colledani and Dr. Marco Diani.

The work requires a strong background in circular economy and recycling, treatment of End-of-Life composites, physics-based modelling and process simulation, as well as a mindset for personal development. This project will be roughly 50/50 modelling/experimental research, and it is hence vital that applicants are keen for such a combination. During the appointment, two secondments are planned:

- 3 months at Head Sport GmbH (Austria) – To evaluate the implementation of recycled composites in sports equipment and gears
- 2 months at KTH (Sweden) - To evaluate the economic and energetic impact of the developed recycling process

During this PhD project, the researcher will:

- Optimize the HVF process for composites recycling
- Implement a cyber-physical model of the High-Voltage Fragmentation (HVF) process
- Experimentally validate the modelling on selected real products
- Participate in the dedicated training programme organised by FibReLoop (including technical, communication, career management and business skills) and in six-monthly project meetings
- Write scientific papers for publication in top-level journals in materials science/mechanics/Engineering
- Present his/her research in project meetings, international conferences and outreach events
- Work in close collaboration with supervisors while being the driving force for his/her own PhD.

Expectations and requirements

A good applicant should be an enthusiastic and self-motivated person with a mindset for personal development. The applicant should meet the requirements for PhD enrolment at Politecnico di Milano. This requires you to have minimally achieved the level of distinction and pass the language requirements (see <https://www.dottorato.polimi.it/en/prospective-phd-candidates/before-applying>). The applicant has obtained (or is about to obtain) good grades for a master's degree in Mechanical Engineering, Aeronautics, Materials Science, Physics or similar. Eligible applications will be assessed on the applicant's (1) academic qualifications, (2) background on circular economy with focus on composites, (3) technical skills, (4) communication skills, and (5) motivation for the project. The Politecnico di Milano has an equal opportunities and diversity policy, and we welcome applications from candidates with diverse backgrounds.

The post is supported by an allowance provided by the European Commission. The EU Researcher Allowances will be used to cover both the employees as the employer's mandatory charges. The fellows are assigned full-time with a PhD scholarship with full social security.

Candidates must fulfil the eligibility criteria:

1. You do not have a PhD degree yet at the start of your assignment.
2. You must not have resided or carried out their main activity (work, studies, etc.) in Italy for more than 12 months in the 36 months immediately before their date of recruitment.

This means that your nationality is not relevant for your eligibility.

Procedure

Please send your resumé and cover letter at marco.diani@polimi.it via email, using the following email subject: "[FIBERLOOP] DC3 application". The cover letter should clearly indicate for which FibReLoop position(s) you are applying, as it is possible to apply for multiple. We kindly ask you not to include a photograph in your CV or cover letter. We are committed to equal opportunities, and by removing these details, it helps us to evaluate people on their skills and experience instead of factors that can lead to unconsciously biased decisions.

Based on the resumé and cover letter, we will ask shortlisted applicants to perform a technical task. Those successfully completing the task within the given time (two weeks) will be invited for an online interview. The interview will consist of three parts and last for about 1 hour in total:

1. You will present the completed task and your adopted approach.
2. You will present a paper relevant to the PhD topic, and assess its strengths and weaknesses.
3. We will ask for clarifications about your background and gauge your motivation and skills.

For further details about this specific position or the procedure, please contact marco.diani@polimi.it. For general information on the PhD process at Politecnico di Milano, please go to <https://www.dottorato.polimi.it/en/prospective-phd-candidates>.

Closing date: until filled

Starting date: 1st of December 2024 the earliest and 1st of February 2025 the latest