

Internship opportunity for Master students at Empa, St. Gallen (Switzerland)



"Materials science and technology are our passion. With our cutting-edge research, Empa's around 1,100 employees make essential contributions to the well-being of society for a future worth living. Empa is a research institution of the ETH Domain"

Job description - *Bond making and bond breaking*

In this internship, students will develop and study the properties of phosphorus-containing **covalent adaptable networks** (CANs). Traditional thermosets (also composites) based on epoxy resins are not recyclable or repairable, due to their permanent covalent bonds. In the last decade, polymeric networks containing **dynamic bonds** (CANs) have been developed, which, under a specific trigger, such as heat, light, pH, or chemicals, can be reprocessed or recycled. CAN chemistry allows to synthesize recyclable and inherently flame retardant epoxy systems for the preparation of advanced composites.

The activity will relate the structural features of the polymer network to the final properties of **vitrimers** (a type of CAN), helping to develop specific applications relevant to today's societal and industrial needs. For this purpose, you will work with other team members to discover **synthetic ways** to obtain novel epoxy-based vitrimers or similar systems, and then study the **fire safety** and **recycling** properties.

You may also contribute to the synthesis and testing of **new flame retardants** and **catalysts** to optimize the preparation of novel transesterification-based vitrimers.

You will learn to organize and plan your work, coordinate with the team, characterize the thermoset materials and report the results. The activity and its outcomes can be included in a Master thesis.

The members of Empa's Advanced Fiber Lab (<https://www.empa.ch/web/s402>) will supervise the Master students. The main objective of the group is the synthesis of functional molecules used as additives for bulk polymers and to modify the surfaces of organic and metal-based materials.

Your profile

You are the right person for this position if you are enthusiastic about plastic recycling and sustainability and want to spend **6 months** working in an international research environment.

We are looking for **two candidates** with the following characteristics:

- currently a Master Student with a specialization in Organic Chemistry / Polymer Chemistry / Material Science / Composite Materials / Chemical Engineering or in a related field;
- willing to learn new chemistry/material science lab skills in an interdisciplinary field;
- good organizational, prioritization, and communication skills and ability to work effectively and independently within a collaborative environment;
- advanced knowledge of English (speaking and writing).

Full accommodation and a monthly salary will be provided to the selected candidates.

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