

## Upcycling the recycled carbon fibers by tailoring interface

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Requirement: Master's Student

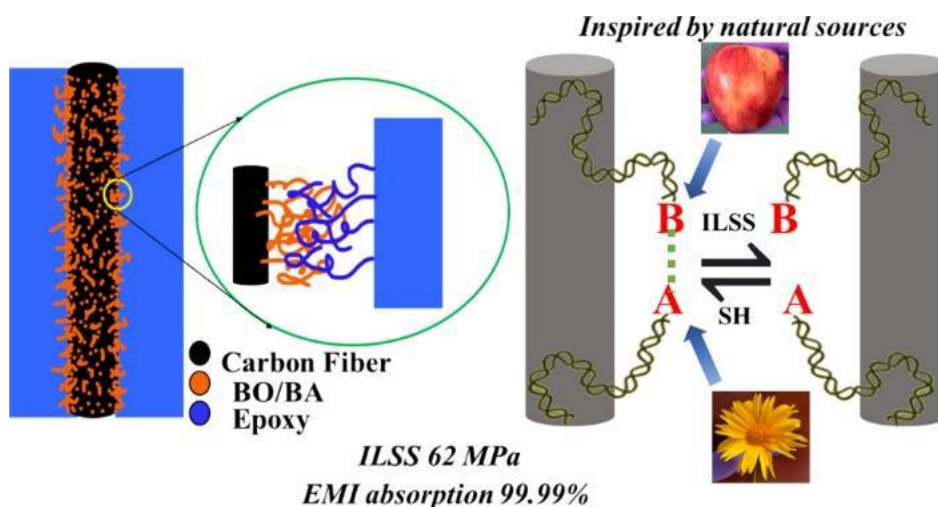
Carbon fiber reinforced polymer (FRP) find applications in a wide variety of sectors such as aerospace, defense, energy sectors, high pressure storage, automotive and sports gears. Though CFRPs possess a long service life, the amount of waste generation during production and post service life reaches up to 35kT/year. Thermal recycling of the CFRPs has emerged as a popular and cost-effective method to recover fibers and polymer matrix (as naphtha and low molecular weight oils). The recycled carbon fibers also have high commercial value. They can be reused to make new laminates. However, the fibers lose surface functional groups, sizing and intrinsic strength post thermal treatment. This leads to weaker composites which are not useful for commercial applications.

This project aims to design sizing coatings for the thermally recycled carbon fibers for improving interface, compensating the loss of mechanical properties of fibers. The sizing will be synthesized and designed according to the targeted matrix. The interfacial strength will be characterized by specialized IFSS tests and bulk mechanical tests like ILSS. There will be a lot of opportunities to learn new characterization, analysis and testing techniques along with theoretical approaches to solve the problem.

This project is joint collaboration of *LPAC*, *EPFL* and *Composite Recycling*. The recycled carbon fibers will be supplied by *Composite recycling*. This is an industrial project and the student has to sign a Non-disclosure agreement.

The following articles give some insights for polymer sizing on carbon fibers.

1. <https://doi.org/10.1021/acsami.4c08161>
2. <https://doi.org/10.1021/acsomega.1c01103>



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