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MetaLab Research Group
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Cluster of Excellence *livMatS*
FIT – Freiburg Center for Interactive Materials and
Bioinspired Technologies,
IMTEK, University of Freiburg

Achieving the symmetry of properties in the bioinspired composites (HiWi, BSc)

Natural materials continue to fascinate scientists by their outstanding mechanical properties. The secret behind the remarkable performance of natural materials is their microstructure that can combine several components with significantly different mechanical properties. For instance, the extreme toughness of a nacre is defined by its structure containing stiff elongated platelets connected by soft interfaces. With modern manufacturing techniques, it becomes possible to replicate such involved natural structures. At the same time, the precise control over geometry and materials achievable in 3D printing allows one to find some flaws in the natural design and improve it. In particular, nacre-inspired composites usually demonstrate increased toughness in one direction, while non-aligned loading may lead to their complete failure. This project aims to develop nacre-inspired 3D-printed composites consisting of stiff and soft components with enhanced properties in multiple directions. We will use a multimaterial 3D printer to fabricate the designed materials and test their properties using a universal testing machine.

The skills that you can acquire during this project:

1. CAD modeling
2. Mechanical testing

Please feel free to contact us if you have any questions.

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Living, Adaptive and Energy-autonomous Materials Systems

