

BIO-INSPIRED SELF-REPAIRING MATERIALS FOR SUSTAINABLE DEVELOPMENT



Figure 1: "Pink Carpet" (*Delosperma cooperi*) at the Botanic Garden of the University of Freiburg.

The project "Bio-inspired self-repairing materials for sustainable development" is thematically assigned to the research focus of "Sustainable Materials" at the Sustainability Center Freiburg. It will be carried out by an interdisciplinary team of natural scientists from the University of Freiburg (Dr. Olga Speck, Prof. Dr. Thomas Speck, Plant Biomechanics Group) together with physicists and engineers from the Fraunhofer Institute for High-Speed Dynamics, Ernst-Mach-Institut, EMI, in Freiburg (Dr.-Ing. Matthias Boljen, Dipl.-Ing. Hartmut Klein, Material Dynamics Department). In the framework of this project, they provide competencies in the fields of biology, biomimetics, material modeling, numerical simulation, and sustainability assessment.

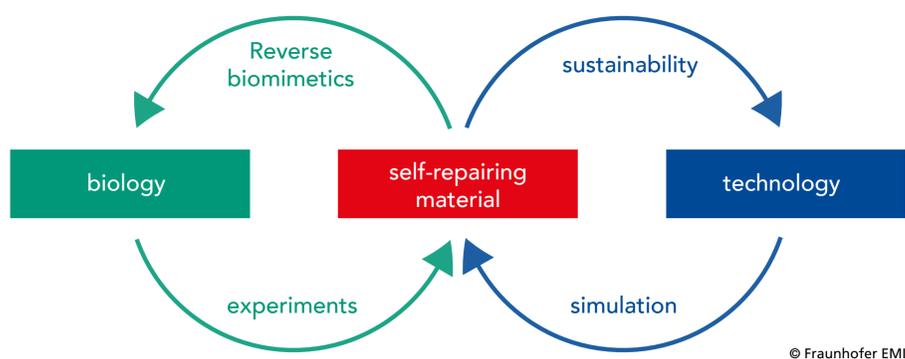


Figure 2: Interrelationship between biology and technology in the current project.

The project aims for:

- quantitative analyses of self-repair processes in selected model plants
- identification of the underlying repair principles
- the transfer and implementation of the identified operating principles into numerical models
- identification of transfer concepts between biological and technological solution strategies
- assessment of the potential contribution of self-repairing materials to sustainable development

The intensive scientific exchange between biology and technology fosters a bidirectional transfer of knowledge. On the one hand, there is the transfer of appropriate biological operating principles in the design of self-repairing materials (biomimetics). On the other hand, the technical modeling methods lead to a deeper understanding of the fundamental biological principles of self-repairing processes (reverse biomimetics).

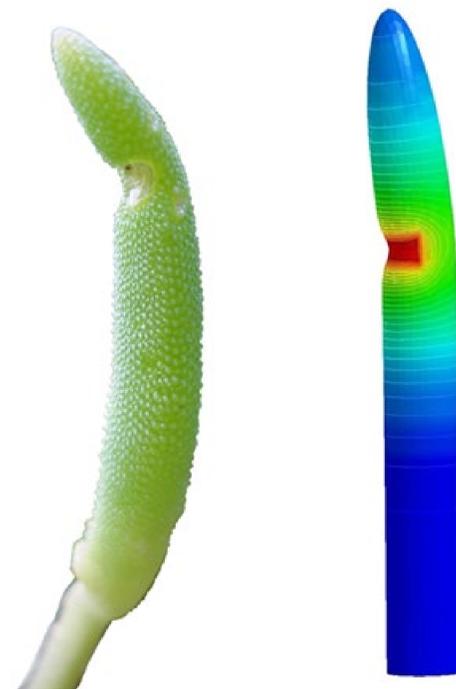


Figure 3: Montage of a healed succulent leaf of the Trailing Iceplant (*Delosperma cooperi*) and of a FEM-simulation.

Contact



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