Cellulose & Wood Materials Lab

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Overview

Our lab aims to understand naturally existing structures in wood-based resources and tailor interactions between renewable polymers, nanoparticles and colloids. The major goal of this work is to find energy efficient routes to build high performance materials contributing to a sustainable future. To this end, we collaborate with researchers and industry together addressing important technological challenges.

Our approach is to combine existing wood architectures with controlled assembly of extracted wood components into new sustainable high-performance materials and value-added technological products. **One tool of specific interest for tailored biomaterial functionality is the use of fungi or enzymes, as living organisms or biologically active substances to modify the material properties**. This biologically inspired functionalization allows us to modify the physical material properties as well as to tailor the bulk and surface towards specific functionality.

We are a dynamic, international and multidisciplinary team of around 40 scientists, postdocs, PhD students and technicians working on both fundamental and applied projects aimed to develop new sustainable materials technologies. **We believe that to advance the field of sustainable materials we need to rethink how materials are processed, how they can be designed for re- or upcycling and how they can adapt and interact with the environment to get new functionalities and leave a minimal footprint at their end of life**. This quest is inherently multidisciplinary and having access also to the viewpoint of the artist has the potential to further enhance both the functionality of our sustainable materials and the potential impact of our technologies in future societies. **We would therefore be happy to host an artist to jointly examine the intersection between arts and science in the context of sustainability and new materials.**

Links

Below are links to some selected media reports featuring our research.
Press releases:

- https://www.empa.ch/web/s604/fungal-biobattery
- https://www.empa.ch/web/s604/eq86-leuchtholz
- https://www.empa.ch/web/s604/aerogel-aus-der-bier-brauerei
- https://www.empa.ch/web/s604/cellulose-display
- https://www.empa.ch/web/s604/time-paper-battery
- https://www.empa.ch/web/s604/cellulose-coating-for-bananas
- https://www.empa.ch/web/s604/papierbatterie

SRF features:

- https://www.srf.ch/play/tv/10-vor-10/video/die-idee-batterien-aus-pilzen?urn=urn:srf:video:fcd76d06-5f29-4a18-8cec-7896dacdceb6
- https://www.srf.ch/audio/morgengast/gustav-nystroem-empa?id=AUDI20250115_RS_0026
- https://www.srf.ch/play/tv/einstein/video/nachhaltig-und-leistungsstark-die-batterie-der-zukunft?urn=urn:srf:video:141ac3a3-f797-4fcc-82f5-42e8de500467