Dr. ANNA SANDAK

Designing with life: engineering the next generation of building materials

Short text: Conducts cutting-edge research in probiotic architecture and sustainable building solutions to develop a new generation of advanced materials.

Abstract:
Materials have shaped civilizations, driving functional, economic, and environmental progress. In architecture, materials define structure as well as aesthetics, performance, and sustainability. Nowadays, the shift toward resilient, adaptive systems demands responsible innovation in material design. Sustainably sourced renewable materials promote ecological responsibility; however, the next frontier lies in bioinspired and engineered living materials (ELMs). By integrating biological components with advanced material science, ELMs introduce self-regeneration, adaptability, and environmental responsiveness, offering new possibilities for dynamic, high-performance architecture. The convergence of engineering, biology, and materials redefines sustainability in the built environment, enabling structures that heal, adapt, and interact with their surroundings. This lecture will present an overview of the prospects of ELMs in the building sector and provide the results of the ERC project ARCHI-SKIN, which develops a living coating system for building facades. It will also introduce the newly funded EIC project REMEDY, which pioneers the archibiome tattoo - a living, bespoke layer for buildings that enhances both aesthetics and functionality. Merging nature and technology enables the reshaping of how we design, build, and experience the built environment, paving the way for a future where architecture is not only sustainable but truly alive.

References:
Sandak A. (2023) Engineered living materials for sustainable and resilient architecture. Nature Review Materials 8, 357–359, https://doi.org/10.1038/s41578-023-00554-0

Biography:
Dr Anna Sandak is the Deputy Director for Science and head of the Materials Department at InnoRenew CoE in Slovenia. She is also an associate professor at the University of Primorska, where she serves as a Management Board member of the New European Bauhaus Academy Pioneer Hub. Her academic background bridges biology (MSc, 1999) and wood science (PhD, 2010). Before moving to Slovenia, she worked in Italy at the National Research Council (CNR-IVALSA). In her 18-year scientific career, she has contributed to over 30 research projects, leading 12 of them. In 2022, Dr Sandak was awarded the ERC consolidator grant for the project ARCHI-SKIN (#101044468), which develops a living coatings system based on fungal biofilm. Her research toward probiotic architecture continues in the frame of the REMEDY project (#101185862) that the European Innovation Council recently awarded under the Pathfinder call. Her research centres on the intersection of biotech and advanced materials, focusing on harnessing renewable materials and engineered living systems to revolutionize the construction industry. By integrating biotechnology with traditional building practices, she aims to create resilient, eco-friendly structures that adapt and evolve with their environments, setting new standards for sustainability in the built environment.