



FRAUNHOFER INSTITUTE FOR SILICATE RESEARCH ISC
WÜRZBURG

PRESS RELEASE

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SAPs4Tissue launched – human tissue models with customized biomaterials.

Human tissue models instead of animal experiments? What is already possible for some questions still faces major hurdles for more complex contexts and applications. In a joint project of the Max Planck Institute for Polymer Research, Mainz, and the Translational Center for Regenerative Therapies at the Fraunhofer Institute for Silicate Research ISC, Würzburg, scientific principles and biomaterials for the standardized production of valid tissue models are to be developed.

Modern medicine increasingly relies on three-dimensional human tissue models in preclinical drug development. These represent an ethically unproblematic and often scientifically more meaningful alternative to animal testing. However, an important prerequisite for safe use in risk and efficacy testing of drugs is that these model systems are as close as possible to human tissue in terms of morphology and functionality.

This is precisely where the SAPs4Tissue project comes in: with the help of ordered molecular protein building blocks, the so-called peptide nanofibrils (SAPs), physiological environmental conditions of the cell are simulated in combination with biological polymers. Human cells see, so to speak, their "natural environment", the so-called extracellular matrix, a soft biopolymer matrix surrounding them. In addition, the molecular building blocks are provided with chemical groups that allow the material properties to be specifically influenced with the aid of external signals, such as light or the pH value. The researchers hope to use this resulting scaffold structure to transform human stem cells into specialized cells and grow them as functional tissues such as the intestine. This is possible through methods known as "tissue engineering," an interdisciplinary field of work that applies principles from engineering and life science for targeted tissue cultivation. The project will also systematically investigate the relationships between molecular signature, three-dimensional structure and tissue-specific function.

The project leaders, Dr. Christopher Synatschke, Dr. Tanja Weil (MPI Polymer Research), Dr. Marco Metzger and Dr. Daniela Zdziebło (Fraunhofer ISC) are confident: "Bringing together the core competencies of biomaterials, stem cell biology and tissue engineering will produce a completely new class of scaffolds that will allow the standardized construction of different human tissues." Success of the work would not only further boost basic research in the field of tissue and disease development, but would also have significant socio-economic relevance through the replacement of

Editorial

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animal testing and through more effective preclinical testing methods, which would have a direct positive impact on the costs for the healthcare system.

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Infobox

The SAPs4Tissue project is funded by the Fraunhofer-Gesellschaft and the Max Planck Society.

Image material



Tissue engineering of human organ models, e.g. for improved drug screening ©
Fraunhofer Translational Center for Regenerative Therapies/Fraunhofer ISC

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Synthesis of specific peptides that form nanofibrils. © Max Planck Institute for Polymer Research, Carsten Costard

The **Max Planck Institute for Polymer Research (MPI-P)** is a leading international research center in the field of polymer research. By focusing on soft matter and macromolecular materials, the MPI-P with its research orientation is unique worldwide. Its task is to produce and characterize new polymers. These polymers can contribute to solving society's pressing problems in the fields of energy, sustainability and medicine. The MPI-P was founded in 1984 and it currently employs more than 500 people from Germany and abroad, the vast majority of whom are involved in research tasks.

The **Fraunhofer Institute for Silicate Research ISC** (headed by Prof. Dr. Gerhard Sektl) is one of the leading R&D centers for materials-based research and development in the fields of resource efficiency, energy, environment and health. With around 400 scientists and technicians, the institute works to develop innovative functional materials and technologies for more sustainable products that use fewer resources, and to make significant contributions to solving the major global issues and challenges of the future. With its parent institute and the **Fraunhofer Translational Center for Regenerative Therapies** in Würzburg and the Center for High Temperature Materials and Design HTL in Bayreuth, Fraunhofer ISC combines first-class materials science expertise with many years of experience in materials processing, industrial application and upscaling of production and process technologies to pilot scale, as well as materials analysis and characterization. With a clear focus on sustainability, the institute is a strong R&D partner for industrial partners and supports less resource consumption and responsible production with its developments.

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