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EUROoC network lays the foundations for joint European organ-on-a-chip research

The Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB is coordinating the establishment of a European research network to promote organ-on-a-chip technology. Organ-on-a-chip systems enable the recapitulation of human organ tissues on a very small scale. They are regarded as a future alternative to animal models and as a technology with great potential for pharmaceutical research and personalized medicine. Since the development of organ-on-a-chip systems requires skills and expertise from various disciplines, the primary aim of the EUROoC network is the interdisciplinary training of young scientists.

Organ-on-a-chip systems are microfluidic platforms integrating human tissue or organ building blocks. Thereby, they constitute *in vitro* models that reproduce biological processes in the human body, which can provide valuable new insights for basic biomedical research. Used as test systems, they can also help in the development and screening of novel pharmaceutical compounds and pave the way for personalized medicine. Organ-on-a-chip systems combine the unique selling points of classical cell assays (human genes and standardization) and animal models (3D tissues and circulation) and have the potential to significantly improve the transferability of preclinical results to later clinical phases. In this way, animal testing can be reduced, and the development of medical innovations can be made more economical, safer and faster.

EUROoC network brings together multidisciplinary expertise

The development and application of organ-on-a-chip systems requires the combination of different competences from various scientific fields – from biology and medicine to engineering and physics. These interdisciplinary requirements have led to the assembly of the EUROoC network, which will kick-off this fall funded by the EU under the highly competitive Marie Skłodowska-Curie Innovative Training Network (MSCA-ITN) programme. In this network, academic and industry scientists from all over Europe that are experts in various disciplines pool their strengths. Eleven main contractual project partners, nine of whom are from the academic sector, one SME and one regulatory authority from the area of consumer health protection, are participating. In addition, ten partner organizations, three of which are academic institutions, five from the industrial sector and two regulatory authorities from the area of human medicinal products are part of the network.

European training program for organ-on-a-chip research

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One focus of the network's work is on the interdisciplinary training of young researchers. "The next generation of researchers will be trained in all aspects of the development and application of organ-on-a-chip systems," explains Jun.-Prof. Dr. Peter Loskill, the interdisciplinary minded physicist who heads the "Organ-on-a-chip" research group at Fraunhofer IGB. "Besides scientific aspects, a further focus is on the education of researchers on how they can market their developments commercially and how they have to deal with regulatory and legal aspects. Ultimately, we want to contribute to strengthening Europe's competitiveness in this emerging field of research."

Under the EUROoC umbrella, the participating researchers will be working on joint projects with the aim to develop advanced organ-on-a-chip systems that recapitulate the properties of the organ tissues as realistically as possible regarding cell types, microenvironment and organ-specific tissue structure and function. In addition, concepts for interlinking individual organ systems to multi-organ-chips and for the integration of sensing elements are also being developed within the network.

The EU MSCA program is both very popular and very competitive, because of its bottom-up approach and scientific excellence. More than 1400 project consortia responded to the call for proposals in January 2018; the funding rate was well below ten percent. Fraunhofer IGB is responsible for overall coordination within EUROoC. The time frame is initially set at four years.

Fraunhofer IGB and Attract

Fraunhofer IGB in Stuttgart has been intensifying its research into organ-on-a-chip technology for several years now. In 2016, an Attract group was founded for this purpose. The group is headed by Jun.-Prof. Loskill, who is also an Assistant Professor at the Eberhard Karls University in Tübingen and previously worked at the University of California at Berkeley in the United States. Attract is an internal funding program of the Fraunhofer-Gesellschaft for particularly forward-looking research fields. The focus is on the strategic development of new competencies within the research organization.

Project partners

Fraunhofer Institute for Interfacial Engineering and Biotechnology (IGB), Germany
Jena University Hospital, Germany
Graz University of Technology, Austria
University of Bern, Switzerland
Uppsala University, Sweden
University of Twente, The Netherlands
Leiden University Medical Center (LUMC), The Netherlands
University of Luxembourg, Luxembourg
École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
German Federal Institute for Risk Assessment (BfR), Germany
Miltenyi Biotec GmbH, Germany

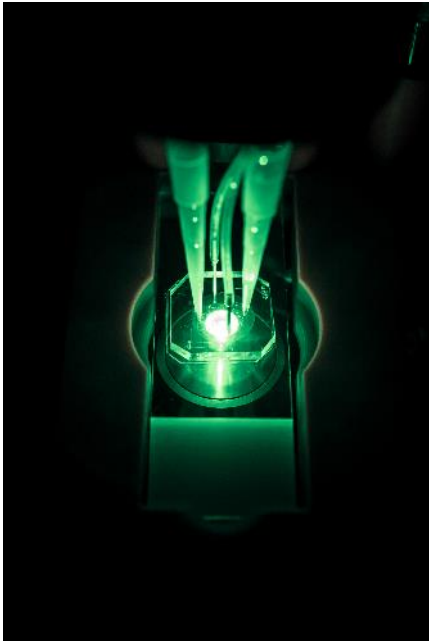
Partner organizations

AstraZeneca plc, United Kingdom
Boehringer Ingelheim Pharma GmbH & Co. KG, Germany
Pyro Science GmbH, Germany
Transgene SA, France
UPM – The Biofore Company, Finland
hDMT, The Netherlands
University of Basel, Switzerland
Eberhard Karls University Tübingen, Germany
National Institute for Public Health and the Environment (RIVM), The Netherlands
Federal Institute for Drugs and Medical Devices (BfArM), Germany

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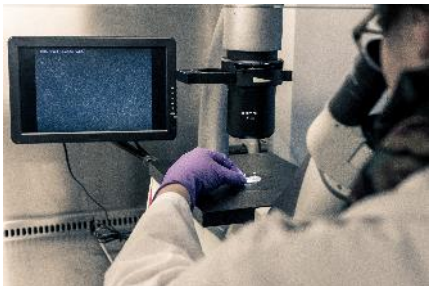
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FRAUNHOFER INSTITUTE FOR INTERFACIAL ENGINEERING AND BIOTECHNOLOGY IGB



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**Development of organ-on-a-chip
systems at Fraunhofer IGB.**

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The **Fraunhofer-Gesellschaft** is the leading organization for applied research in Europe. Its research activities are conducted by 72 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of more than 25,000, who work with an annual research budget totaling 2.3 billion euros. Of this sum, almost 2 billion euros is generated through contract research. Around 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

The **Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB** develops and optimizes processes, technologies and products in the fields of health, chemistry and process industry, as well as environment and energy. We combine the highest scientific standards with professional know-how in our competence areas – always with a view to economic efficiency and sustainability. Our strengths are offering complete solutions from the laboratory to the pilot scale. Customers also benefit from the cooperation between our five R&D departments in Stuttgart and the institute branches located in Leuna and Straubing. The constructive interplay of the various disciplines at our institute opens up new approaches in areas such as medical engineering, nanotechnology, industrial biotechnology, and environmental technology.
