PRESS RELEASE

Fraunhofer IBMT at LABVOLUTION 2019

Fraunhofer three times in joint action

Together, the Fraunhofer Institute for Biomedical Engineering IBMT, the Fraunhofer Institute for Applied Information Technology FIT and the Fraunhofer Project Center for Stem Cell Process Engineering SPT present selected topics of laboratory technology and biotechnology in the mobile epidemiological BSL2 laboratory, the so-called »mobile EpiLab«.

Automation solutions for workflows in stem cell process engineering

For biotechnological and pharmaceutical companies, the development of cell culture automation using innovative materials is a promising approach to optimize existing processes. By customized material characteristics, expansion and/or differentiation of human stem cells (the focus lies on human induced pluripotent stem cells, hiPSCs) should be positively influenced and automated solutions for the production for high-qualitative cells should be developed. These generated cells can then be used for the production of model systems for drug tests, toxicity studies or disease modelling, thus providing e. g., a major contribution to personalized medicine or the avoidance of animal experiments. The **Fraunhofer Project Center for Stem Cell Process Engineering SPT** (https://www.spt.fraunhofer.de/) is showing a functional suspension bioreactor on the basis of which existing protocols can be optimized and in which the newly developed stem cell processes can be carried out. Due to the possibility to cultivate anchorage-dependent stem cells on so called microcarriers, automation solutions for stem cells and material design can be combined by this cultivation system and process optimization is feasible. In the direct context of stem cell processes, further approaches of the Fraunhofer Project Center SPT in the fields of actuators, microfluidics, bioprinting, image analysis and analytics will be presented.

See more in the »mobile EpiLab« …. Hall 20 stand C05

»Stabil-Ice« – An innovative disposable for cultivation, differentiation and ice-free cryopreservation of adherent cell systems

The »Stabil-Ice«-disposable is a novel labware in which a complete workflow can be realized from cultivation, manipulation (e. g. differentiation) to long-term storage through ice-free cryopreservation (vitrification) and subsequent efficient thawing processes of adherent cells. A prototype of the novel labware product will be presented in different dimensions (96-well and 24-well format) by the **Fraunhofer Institute for**

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Biomedical Engineering IBMT (https://www.ibmt.fraunhofer.de). With these disposables, standard processes in cell-based workflows for biomedical and pharmaceutical research can be imaged and further on, a time-independent storage of adherent cell systems will be enabled. The special geometry of the disposable reduces the heat capacity of the sample and high cooling rates during the vitrification process will be achieved, so that a sterile and ice-free cryopreservation is enabled. Without the inevitable separation of phases that occurs with conventional cryopreservation, the intercellular structures and intracellular contacts of cells that usually grow adherently are preserved and can be used immediately after thawing. For system compatibility, the disposable presented is based on standard dimensions of multiwell plates and, compared to standard labware (e. g. Petri dishes), allows the complete workflow of, e. g. cell-based drug screening assays for pharmaceutical industry, in a scalable manner. Long-term storage in "ready-to-use" condition of, e. g. human stem cells and neuronal cells derived thereof, is thus made possible very easily and a game changer within the field of pharmaceutical, biotechnological and medical industries and research.

See more in the »mobile EpiLab« …. Hall 20 stand C05

Toxicity testing using organ-on-chip screening platform

A screening platform consisting of interconnectable microfluidic modules will be presented. Each module represents a tissue of the organism (e. g., intestine, liver, kidneys) and consists of a miniaturized system for the cultivation of cells. The characterization of the cells is performed with integrated optical and electrical systems. The platform includes a portable incubator microscope, which combines a microscope with a miniaturized incubator for cell culture in just one device. An integrated module for temperature control assures the cell's temperature conditioning at 37 °C in a microfluidic chip. By means of an adapted external microfluidic system, the cell culture medium is permanently renewed at very low flow rates without exposing the cells to excessive shear stress. The incubator microscope thus allows the online monitoring of the cells by bright field and fluorescence microscopy under constant cell culture conditions without using further devices. Integrated electrodes in the microfluidic chip enable the electrical characterization of the cultivated cells using impedance spectroscopy. The system simulates the way of toxic substances (like nanomaterials) through the human body and can be used for risk assessment of toxic substances, e. g. within the scope of REACH. Other possible applications are in pharmaceutical research and environmental analysis.

The **Fraunhofer Institute for Biomedical Engineering IBMT** (https://www.ibmt.fraunhofer.de) is using this exhibit to demonstrate its interdisciplinary expertise in the development of new in vitro models with miniaturized cell culture systems.

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Automated monitoring and analysis of microbial growth – growth monitoring

The monitor developed by the **Fraunhofer Institute for Applied Information Technology FIT** (https://www.fit.fraunhofer.de) analyses the growth of microbial cultures in an automated process. It has been developed within an EFRE project with several partners. The use of standardized microtiter plates ensures the compatibility of the system with existing workflows in the laboratory. The system stands alone compared with competing products due to the large numbers of cultures monitored in parallel (96/384-well-plates) and the generation of online growth curves. The related software evaluates the growth of each well individually. Combined with preset antibiotics in the microtiter plate, the system can be used e. g. to perform antibiotic susceptibility tests (AST) in a short time. The growth monitor is of particular interest for clinical analysis laboratories and microbiological research institutions. Additionally, it can support the screening of drugs in human and animal cell cultures and is therefore of great interest for research in the pharmaceutical industry. Fraunhofer FIT has contributed its expertise in the development of optical systems, process automation and system integration to the development of the growth monitor.

See more in the »mobile EpiLab« …. Hall 20 stand C05

The mobile EpiLab | Mobile laboratories and medical units in use

Since 2005, the **Fraunhofer Institute for Biomedical Engineering IBMT** (https://www.ibmt.fraunhofer.de) has been developing, in cooperation with partners, mobile units up to biosafety level 3 (BSL3) for flexible, location-independent and autonomous use. The next generation of laboratory technology is being applied within the alliance of branches "Labor der Zukunft®", initiated by the Fraunhofer IBMT together with the Saarland state government. Therefore, besides the topics of digitization, automation, mobility and security, also non-customary areas (as e. g., electronics, automotive engineering) are being addressed in order to strengthen an active technology transfer into the area of laboratories. As a technology demonstrator, the vehicle in use, based on a semi-trailer, which has already been on the road throughout

Germany on behalf of the German Environmental Specimen Bank – Human Samples (on behalf of the German Environment Agency (UBA), will be shown. This proven "already-used" unit impressively demonstrates how new approaches can find their way into applications. All exhibits of the three Fraunhofer institutions presented here in the press release, are presented in the 55 sqm usable area of the vehicle.

See more in the »mobile EpiLab« …. Hall 20 stand C05

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