

Microfluidic Bioprinting for the creation of human-derived in vitro 3D cellular models

Cristina Colosi

Center for Life and Nanoscience – Italian Institute of Technology

3D-Bioprinting is an emerging tool in life science research and tissue engineering that consists in the use of 3D-printing technologies for the creation in vitro of living bio-constructs mimicking human organs and tissues. This is realized by the simultaneous deposition of living cells and extracellular matrix (ECM) components, usually composed of synthetic or naturally-derived hydrogels, that provide a three-dimensional environment for cell culture, migration and organization. The current challenge in this field consists in developing 3D printing strategies that not only can deposit cells and hydrogels with high survival rates and resolution, but that concurrently produce 3D bio-constructs that efficiently and extendedly replicate tissue architectures and functions. Here we present the work that has been performed in the framework of the Italian Institute of Technology (iit), specifically at the Center For Life and Nanoscience (CLNS, iit@Sapienza), for the creation of novel, 3D-bioprinted, human-derived 3D cellular models. These artificial bio-constructs are designed to perform reliable and cruelty-free biology research in vitro, establishing valid alternatives to animal testing, and to define future strategies for regenerative and precision medicine applications.