BRIGHTER: Stereolithographic 3D bioprinting

Challenge

Current bioprinted tissues for drug testing and disease modelling are composed primarily of thin, avascular and no-innervated cell formulations with limited cell types. Continuous refinement and improvement of tissue engineering strategies is seen, but several challenging practical problems persist, including:

- Lack of complex 3D structures recapitulating tissue microstructure
- Low speed and lack of spatial resolution to define tissue microstructure
- Limited cell viability

The current pharmaceutical market has an urgent need of complex in-vitro models able to recapitulate tissue structure and function, to achieve novel efficient and ethical models able to overcome in-vitro drug testing limitations. These systems need to be precise, biocompatible and high-throughput, to have a real impact on the drug testing market and to be an efficient bioprinting solution that can reproduce tissue complexity.

Market

In **2021**, the European **bioprinting market** was valued at **$219.94 million**, which is expected to grow at a CAGR of 18.71% to reach **$615.58 million** by 2027. Bioprinting is a hot-topic area with a high market projection. BRIGHTER technology can make an impact in bioprinting of living cells with optimised bio-inks. The market of living-cells bioinks was valued at $84.46 million in 2021, and is expected to grow to $242.78 million by 2027, whereas the market of hydrogels was valued at $78.17 million by 2021, and is expected to reach $219.45 million by 2027, demonstrating the **strong market value of the asset.**

Asset

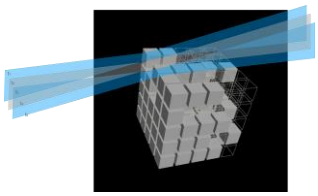
BRIGHTER offers a bioprinting technology able to produce **3D complex tissue structures**, exploiting recent advances in **light-sheet microscopy** to enabling an original **top-down lithography** approach. It enables **high spatial resolution** attained at **high printing speed**. BRIGHTER's bioinks are faster forming hydrogels that improve cell viability and function, ensure homogenous distribution of cells, and allow for long-term cultures. Since primary cells are sensitive to hydrogel stiffness and composition, BRIGHTER technology allows for the generation of custom setups for optimal primary cell culture. Furthermore, tuning of BRIGHTER's polymers compositions allows cells (as dermal fibroblasts) to grow even in relatively stiff substrates.

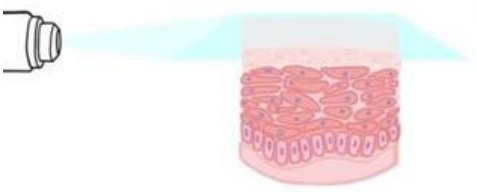
BRIGHTER technology allows the printing of complex hollow structures that mimic hair follicles and venous cavities, thus being able to reproduce tissue landscapes in an **unpreceded fast and high-performance way.**

Asset Value

- High resolution and high printing speed with **low light dose** required
- High cell viability and **long-term culture**
- Hydrogel **stiffness and chemistry modifiable** by tuning the exposure light
- Reproduce **complex 3D structures:** skin, cornea, gut

Fast and precise 3D bioprinting of polymers containing living cells keeping 99% viability





Uses

- Precise bioprinting of skin, gut, cornea
- Drug screening and testing
- Testing of cosmetic products (skin)

Team

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Gustaf Mårtensson - Mycronic
Francesco Pampaloni - GUF
Helmut Wurst - Cellendes
Ruby Shalom-Feuerstein - Technion

Stage of Development

- Laboratory-validated bioprinter prototype and bioinks
- Laboratory scale validated complex model of skin
- Bioinks for gut, cornea, and skin

Intellectual Property Status

A patent that protects the bioprinting system has been filed with priority date in August 2020. It has entered national phase in Europe, USA, and China in February 2023. Owned by IBEC, GUF, UB, Mycronic

Exploitation Plan

Spin-off creation

Contact

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