HYDROTECH INX© U200

"MICRO TO MACRO GEL"

HYDROTECH INX© U200 is the first biocompatible hydrogel resin enabling two-photon polymerization induced printing from the micro to the macro-scale. It is a ready-to-use liquid synthetic resin for the fabrication of bioinert hydrogel structures with ISO 10993-5 certified biocompatibility. The highly reactive strong and flexible material enables printing of macrostructures with micrometer precision, which makes it suitable for a whole range of biological applications.

APPLICATIONS

Thanks to the bio-inert nature, ISO certified (10993-5) biocompatibility and mechanical robustness, the hydrogel is ideal for organ-on-chip applications, where cell interactivity is undesired (e.g. inside the channels) (Figure 1). Additionally, the liquid state of the resin enables straightforward injection of the material into the microfluidic chips prior to printing in combination with efficient removal of uncrosslinked material after printing.

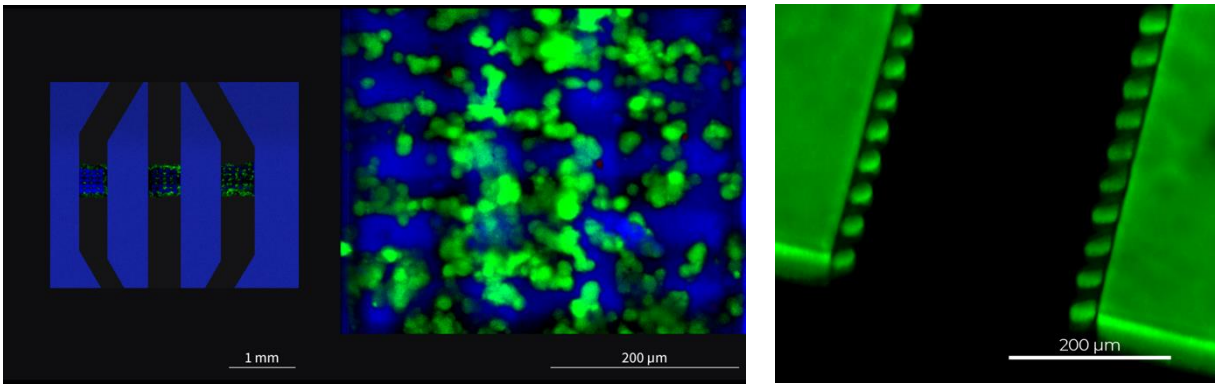

Figure 1: Left: Breast cancer-on-a-chip model, where the outer geometry of the chip is printed using HYDROTECH INX© U200, while the inner scaffold structures are printed using HYDROBIO INX© U200 containing MCF-7 breast cancer cells. Right: Microvilli model to mimic the intestinal structure.

The high reactivity and easy processing allow for versatility in chip design (Figure 1). This includes the development of complicated architectures and the generation of cell 'entrapment' areas to position cells exactly at the site of the readout sensor of the chip or to create distinct and separated areas for the parallelization of measurements.

What's more, the viscous resin enables the generation of complicated chip designs with microfeatures at subcellular resolutions to mimic natural architectures such as intestinal villi on chip inside a microfluidic channel (Figure 1).

Finally, additional complexity can be added by combining the material with cell-encapsulating resins such as HYDROBIO INX© U200 in a two-stage printing process to produce complicated 3-dimensional cell cultures such as cancer-on-chip models. Thanks to the robust but flexible nature of HYDROTECH INX© U200, generating precise 3D architectures to enable high-throughput production of microfluidics chips is achievable.

PROPERTIES & PROCESSING

HYDROTECH INX© U200 is a viscous liquid at room temperature which provides easy and fast processing. Stable structures can be printed using high scanning speeds up to 750 mm/s using different objectives (i.e. 5x, 10X, 20X, ...). Additionally, thanks to its liquid nature, in combination with the absence of volatile components, it allows for printing processes in the VAT mode, thereby expanding the maximum dimensions of structures up to 40 mm in height with micrometer resolutions (Figure 2).

Complex and open geometries can easily be printed thanks to its mechanical robustness. The resulting flexible structures can recover their original shape as seen from the compress-release cycles, illustrated in Figure 3.

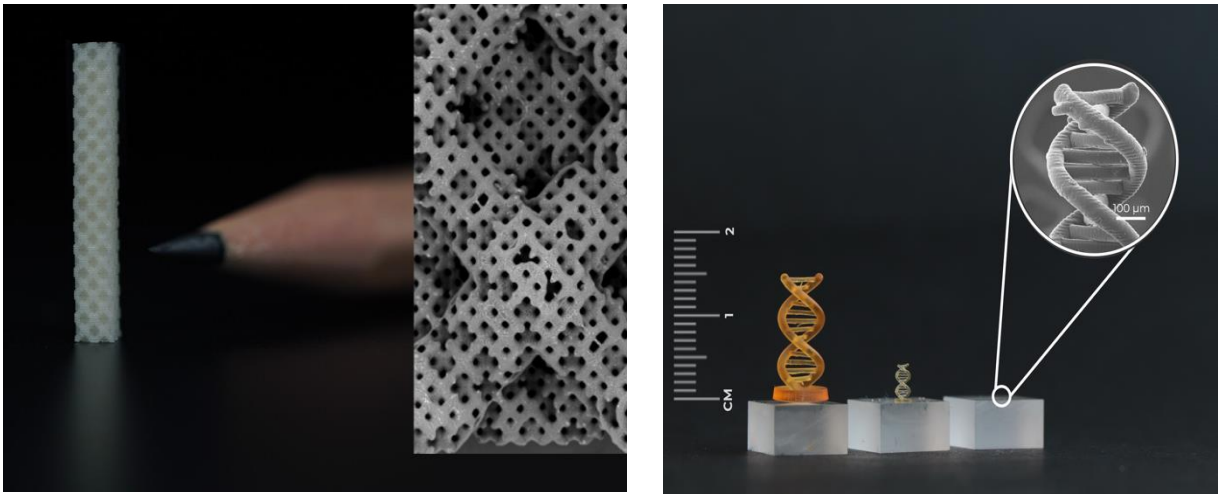

Figure 2: Mesoscale structures with microscale precision.

HYDROTECH INX© U200

"MICRO TO MACRO GEL"

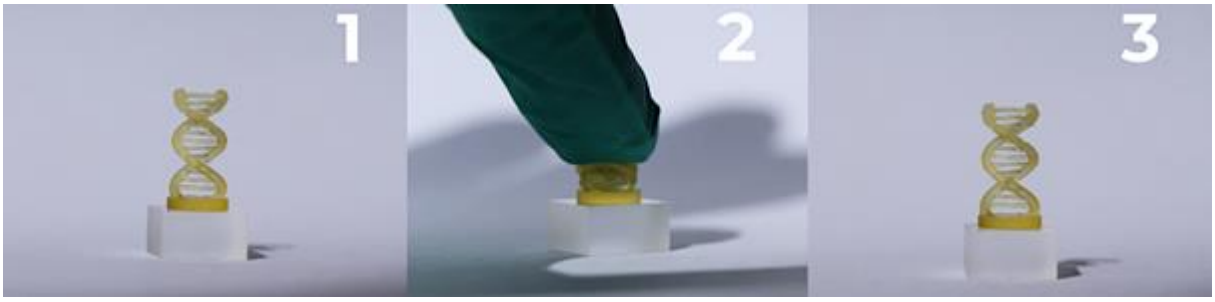

Figure 3: 3D printed DNA structure (1), compressed (2) and recovered after stress release (3).

Thanks to the low water absorption capacity (60 to 80 % over its dry weight), the printed structures do not undergo large structural deformations after hydration in aqueous media.

Physical Properties	HYDROTECH INX© U200
Appearance	Viscous orange liquid
Viscosity	1 - 10 Pa.s
Degree of swelling (%)	60 - 80
Young's modulus*	3 - 4 MPa
Storage modulus after crosslinking	200 - 1200 kPa

* In equilibrium swollen state

BENEFITS

✓	Biocompatibility	No toxic effect after printing (ISO 10993-5 CERTIFIED)
✓	Bio-inert	Non-cell-interactive material
✓	Throughput	High throughput thanks to high reactivity
✓	Processability	Micro- and macro-scale structures with good shape fidelity.
✓	Mechanical integrity	Soft and flexible hydrogel
✓	Stability	Non-degradable hydrogel suitable for long term applications.
✓	Easy to handle	Provided as ready-to-print formulation in amber vials.
✓	Reproducibility	Production under strict quality control

HYDROTECH INX© U200

"MICRO TO MACRO GEL"

PRODUCT FAMILY

Discover equivalent products in our catalog of resins:

	Organic - Inorganic Hybrids	HYDROTECH INX© U100	HYDROTECH INX© U200
Strength	✓✓	✓✓	✓
Flexibility	✗	✓	✓✓
Hydrogel	✗	✓	✓
Biocompatibility	✗	✓	✓
High Resolution	✓	✓	✓
High Reactivity	✓	✓	✓
Printability in Vat Mode	✓	✗	✓

3D PRINTER COMPATIBILITY

Our MPL bioinks can be used with a range of MPL systems. HYDROTECH INX© U200 has already been validated on:

- ✓ Upnano NanoOne
- ✓ Upnano NanoOne Bio

If you would like to discuss your printer's compatibility with our resins, please contact us at info@bioinx.com