



HYDROBIO **INX**[®] X100

“Highest resolution ever achieved for a cell interactive hydrogel!”

The HYDROBIO INX[®] X100 product family consists of gelatin-based hydrogel products which provide all the biological benefits of gelatin, in combination with high resolution processability enhanced by a high reactivity and fast curing speed. Therefore, structuring can occur at relatively low laser powers and high scanning speeds



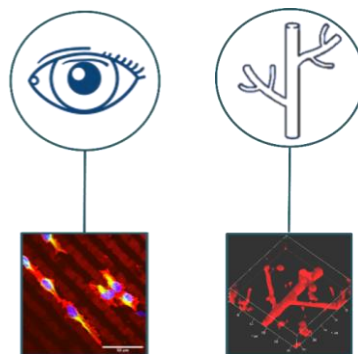
HYDROBIO INX[®] X100 is based on gelatin type B derived from natural collagen which is modified with photo-crosslinkable functional groups enabling efficient multiphoton processing at 780 nm in the presence of the supplied crosslinker.

After processing, it mimics the natural extracellular matrix because it is derived from natural collagen. Additionally, as the formed hydrogel is biodegradable, it allows cells to remodel the environment and substitute it with newly formed extracellular matrix over time.

BIOLOGICAL APPLICATIONS

HYDROBIO INX[®] X100 is gelatin-based, making it suitable for a very wide range of biological applications.

In this respect HYDROBIO INX[®] X100 is suitable for structuring followed by cell seeding. As a consequence it is to the best of our knowledge the only commercially available cell interactive, biodegradable high resolution (down to 1 μm) resin.





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Examples of the biological performance of the HYDROBIO INX[®] product family include:

- ✓ Culturing and guiding corneal endothelial cells for ocular applications. These cells are notorious for their difficult culturing conditions, but nevertheless adhere and proliferate easily on 3D printed patterns using the HYDROBIO INX[®] X100 formulation.
- ✓ Formation of an endothelial cell lined microvascular channel using HUVECs using HYDROBIO INX[®] X100
- ✓ Seeding adipose derived stem cells on HYDROBIO INX[®] X100 microscaffold (Fig.1)

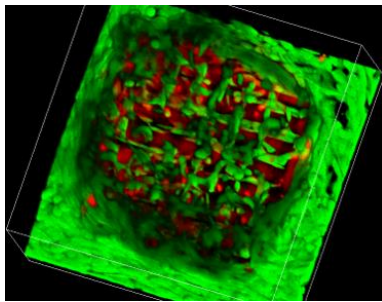


Figure 1: Adipose derived stem cells seeded onto HYDROBIO INX[®] X100 scaffold

PROPERTIES & PROCESSING

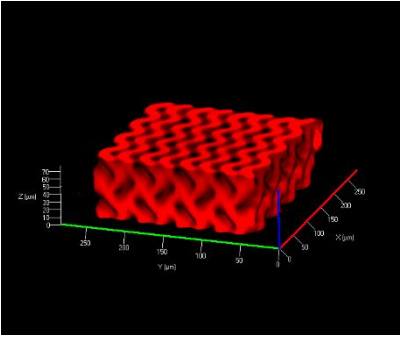
The HYDROBIO INX[®] X100 product family is offered as a 2-component system. The HYDROBIO INX[®] X100 family can be processed after dissolving the crosslinker, followed by blending with the red gel, which turns into liquid after heating above 30°C to generate a photo-crosslinkable resin. After application on the substrate, the resin will form a gel again, thereby providing support to free standing structures during printing.

Physical Properties	HYDROBIO INX [®] X100
Appearance	Red gel
Storage Modulus (kPa)	4 - 26
Post processing linear swelling (%)	15 - 50
Post processing total volume increase (%)	50 - 250
Refractive Index	1.34 – 1.36



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HYDROBIO INX® X100 resins are characterized by fast curing kinetics, after which the material becomes physiologically stable (Figure 2). However, despite being physiologically stable, the material can still be degraded enzymatically during cell proliferation. After curing, the resin is characterised by a storage modulus in the range of 3 – 26 kPa, making it suitable for a range of soft tissue applications.

After processing, the material will take up a limited amount of medium, resulting in a small increase in dimensions after printing, typically ranging around a 15 – 25 % linear increase.

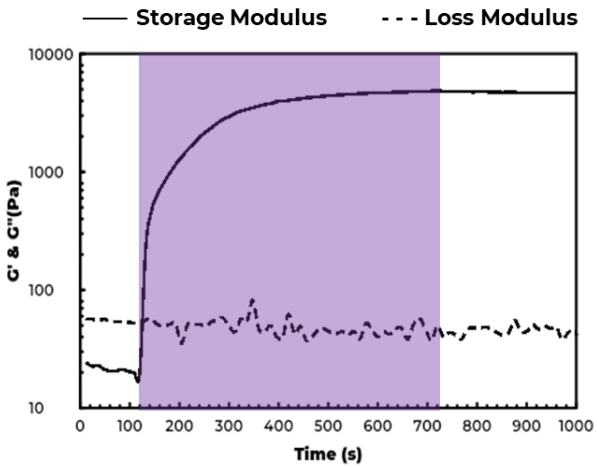


Figure 2: Storage and loss moduli of HYDROBIO INX® X100 during UV crosslinking with a UV photo-initiator

BENEFITS OF THE HYDROBIO INX® X100 PRODUCT FAMILY

- ✓ Biocompatibility: Supports cell adhesion and proliferation
- ✓ Reproducibility: Production under strict quality control
- ✓ Biodegradability: Enables cellular remodelling of the printed matrix
- ✓ Easy handling: Delivered in a ready-to-use kit containing a concentrated stock solution, dilution buffer and crosslinker for 10 prints. Ready for printing in 10 min
- ✓ Stable for at least 5 months at 4 - 8°C



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HYDROBIO INX[®] X100 combines all the benefits of conventional gel-MA based bioinks with efficient high resolution processing. As a consequence, it is the ideal material to transfer previous low resolution gel-MA related successes towards high resolution applications.

	Organic-Inorganic Hybrids	Conventional gel-MA based inks	HYDROBIO INX [®] X100
High resolution	✓	✗	✓
Cell-encapsulation	✗	✓	✗
Biodegradability	✗	✓	✓
Biocompatibility	✗	✓	✓
Hydrogel	✗	✓	✓
High reactivity	✓	✗	✓

3D PRINTER COMPATIBILITY

Our multiphoton lithography bioinks can be used with a range of multiphoton lithography systems, and have already been validated on the following systems:

- ✓ UpNano NanoOne
- ✓ UpNano NanoOneBio
- ✓ Nanoscribe Photonic Professional GT2

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