



STABLE INX[®] X100

Stability for long lasting support



STABLE INX[®] X100 is a synthetic cell-interactive scaffold ink. It allows an easy printing process as a result of its shear thinning behavior, as illustrated in Figure 1. At high shear rates, it exhibits low viscosity which is favorable for an easy injection from the printing nozzle. However, at low shear rates it exhibits high viscosity, which is required for shape retention after deposition.

Provided in a ready to print cartridge, STABLE INX[®] X100 is cell interactive and non-biodegradable. Photo-crosslinking results in a flexible yet strong hydrogel. Therefore, it can provide long lasting and durable support to a variety of cells and cellular structures.

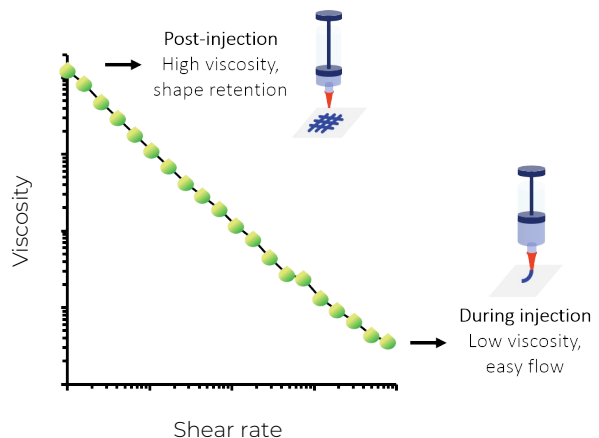
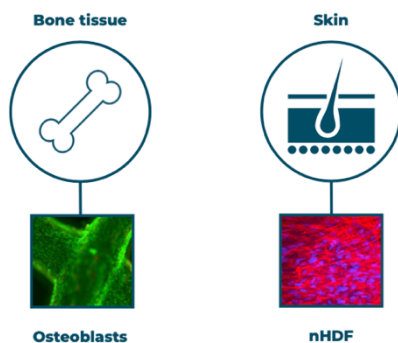


Figure 1: Typical flow curve for a shear thinning fluid: A decreasing viscosity profile as a function of shear rate

BIOLOGICAL APPLICATIONS



STABLE INX[®] X100 has been used to generate and sustain 3D cellular structures of a variety of human tissues, including bone tissue and fibroblasts (nHDF). For more information on the biological applications of STABLE INX[®] X100 and the parameters used to generate these 3D constructs, contact us on info@bioinx.com




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BENEFITS OF STABLE INX® X100

- ✓ Biocompatible Exceptional biocompatibility and support for cell adhesion and proliferation
- ✓ Biostable Suitable for long term applications
- ✓ Processability The shear thinning behavior enables easy printing
- ✓ Easy Handling Delivered in a ready-to-use cartridge
- ✓ UV-crosslinkable Enables rapid UV crosslinking, resulting in robust hydrogels
- ✓ Mechanical integrity Very robust hydrogel which enables load bearing applications, and easy manipulation of printed constructs
- ✓ Reproducibility Production under strict quality control to provide a material that delivers every time

Table 1: Typical benefits of STABLE INX® X100 over conventional bioinks.

	Conventional Alginate-based bioink	Conventional gel-MA based bioink	STABLE 
Strength	✗	✗	✓
Cell-interactivity	✗	✓	✓
Biostability	✓	✗	✓
Biocompatibility	✓	✓	✓
Shear-thinning	✓	✗	✓
Photocrosslinkable	✗	✓	✓

PROPERTIES & PROCESSING

STABLE INX® X100 is a transparent gel at room temperature. The physical characteristics of the product are listed in Table 2.



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Table 2: Physical properties of STABLE INX® X100

Physical Properties	STABLE INX® X100
pH	7.0 – 9.0
Viscosity (low shear) (Pa.s)	1000 - 7000
Viscosity (high shear) (Pa.s)	0.5 - 5
Storage modulus after UV crosslinking (kPa)	250 - 500

STABLE INX® X100 reveals a shear-thinning behavior as shown in Figure 2 (a). This is favorable for extrusion-based 3D printers as the printing ink is easily injected through the printing nozzle, and the post-injection flow is minimized to prevent structural deformation.

To enable an optimal printing process ensuring shape fidelity, an ink should not only exhibit shear-dependent viscosity, but its viscosity must also exhibit a rapid decrease and rapid recovery upon a change in the shear conditions. After ejecting from the printing needle, an ink solution should quickly regain its viscosity upon deposition onto the printing surface. The rate of viscosity recovery for STABLE INX® X100 was studied via rotational step shear tests at shear rates of 0.1 s^{-1} , 100 s^{-1} and 0.1 s^{-1} in the sequential order. As shown in Figure 2 (b), STABLE INX® X100 exhibits a rapid viscosity recovery, regaining more than 85% of its viscosity after deposition.

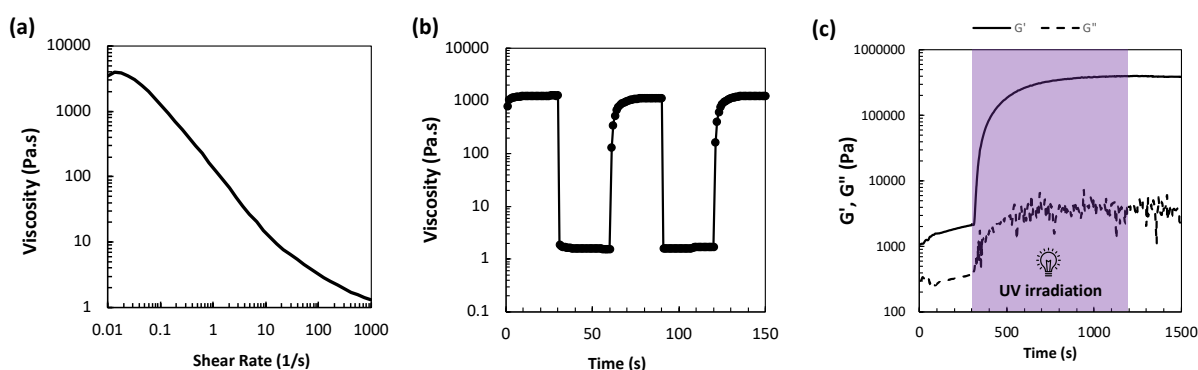


Figure 2: (a) Flow curve of STABLE INX® X100 as a function of shear rate, (b) viscosity of STABLE INX® X100 tested in transient shear rate conditions and (c) storage and loss moduli of STABLE INX® X100 recorded via a rheometer during UV irradiation.



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STABLE INX® X100 is photo-crosslinkable, and therefore the structures can be illuminated with UV irradiation during or after printing process. Prior to UV irradiation, the ink exhibits a storage modulus higher than its loss modulus, which is characteristic for physical gels (Figure 2 (c)). After irradiation with UV light, the ink exhibits a rapid crosslinking process as indicated by the steep increase of storage modulus. Once crosslinking is complete, the ink reaches a storage modulus ranging between 250 - 500 kPa.

3D PRINTER COMPATIBILITY

Our resins have been used repeatedly and successfully with the following printers:

- ✓ Regemat3D
- ✓ FelixBio
- ✓ Cellink BIOX

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