SOLID INX© X100

No need for heat



SOLID INX© X100 is a hydrophobic photo-crosslinkable synthetic biodegradable polyester based on our patented CURASOL® technology.

SOLID INX© X100 is non cell-interactive and combines the benefits of conventional stiff polyester materials with low temperature (< 65 °C) processability.

It is provided in a ready-to-print cartridge.

Figure 1 illustrates the printing of SOLID INX© X100 from melt. The ink is in molten state in the dispenser (~60 °C), after which the printed struts are solidified as a result of rapid crystallization. Subsequently, the printed scaffold is irradiated with UV light for generating a crosslinked network.

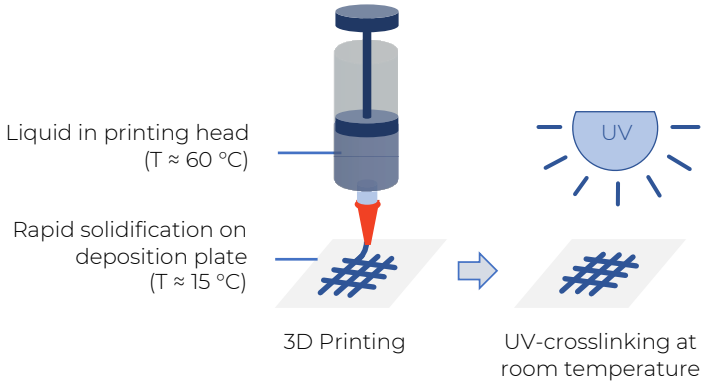


Figure 1: Schematic representation for the printing of SOLID INX©

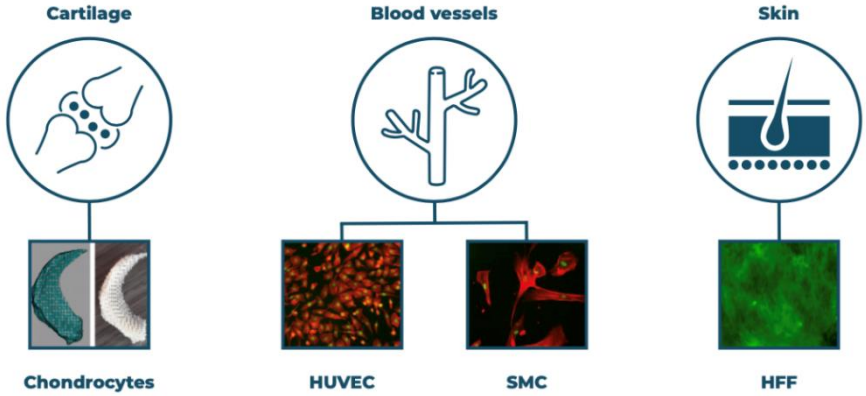
BIOLOGICAL APPLICATIONS

SOLID INX© X100 has been used to generate and sustain 3D cellular structures of a variety of human tissues, including cartilage (Chondrocytes), blood vessels (Human umbilical vein endothelial cells, HUVEC and smooth muscle cells, SMC) and skin (Human foreskin fibroblasts, HFF).

For more information on the biological applications of SOLID INX© X100 and the parameters used to generate these 3D cellular structures, contact us on info@bioinx.com.

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Our prefilled cartridges can be printed immediately by applying pressures of 15-160 kPa (nozzle sizes from 22-27 G). Figure 2 shows SOLID INX© X100 scaffolds that were printed using a pneumatic 3D printer. The scaffolds have a highly uniform pore and strut morphology with a 200-300 µm strut size. After irradiation with UV-A light, the crosslinked scaffolds are robust and flexible.

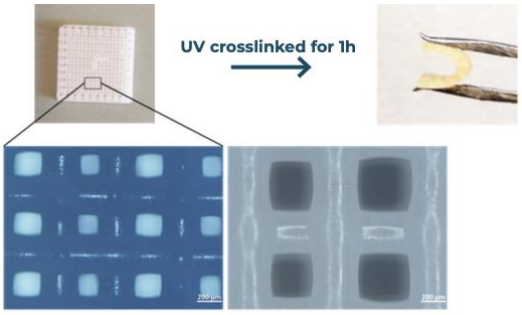


Figure 2: Photographs and optical microscopy images of a scaffold printed using a 27 G conical nozzle.

BENEFITS OF SOLID INX© X100

✓	Biocompatibility	Exceptional biocompatibility and no contact toxicity
✓	Biodegradable	Fully biodegradable material allowing cellular remodeling of the printed matrix.
✓	Processability	Thanks to the CURASOL® technology, the material can be processed at low temperature followed by photocrosslinking, making it ideal for hybrid scaffolds.

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✓ Mechanical integrity	Robust yet flexible polymer suitable for stiffer tissue engineering applications.
✓ Easy Handling	Delivered in a ready-to-use cartridge. Ready for printing straight after heating.
✓ UV-curable	Efficient UV-based crosslinking.
✓ Reproducibility	Production under strict quality control to provide a material that delivers every time.

Table 1: Typical benefits of SOLID INX© X100 over conventional polycaprolactone

	Conventional Polycaprolactone	SOLID INX
Strength	✓	✓
Flexibility	✗	✓
Biodegradability	✓	✓
Biocompatibility	✓	✓
Photo-crosslinking	✗	✓
Printability at low temperature	✗	✓

PROPERTIES & PROCESSING

SOLID INX© X100 is a semi-crystalline solid at room temperature with a melting temperature around 50°C and crystallization temperature around 25°C (Table 2).

SOLID INX© X100 displays Newtonian fluid characteristics as shown in the flow curve in Figure 3a. The ink formulation has a viscosity in the range 10-30 Pa.s and does not change remarkably in the applied shear rate range of 0.01-1000 s^{-1}. The viscosity of the product in this range is suitable for an easy extrusion from the nozzle during printing, resulting in a printable formulation in pneumatic 3D printers operating at pressures between 80-160 kPa.

Table 2: Physical properties of SOLID INX© X100

Physical Properties	SOLID INX© X100
Melting temperature (°C)	40-60
Crystallization temperature (°C)	20-30
Crystallinity (%)	30-40
Viscosity (Pa.s)	10-30
Young's modulus (MPa)	150-200

When SOLID INX© X100 is irradiated with UV light, a strong (Young's Modulus: 150-200 MPa) yet flexible material is obtained (Table 2 and Figure 3b).

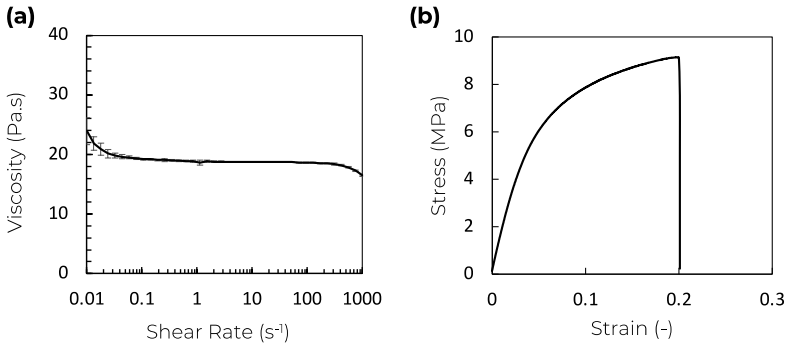


Figure 3: (a) Flow curve of molten SOLID INX© X100 as determined via rotational rheology tests at 60 °C, (b) Stress-strain curve of SOLID INX© X100.

3D PRINTER COMPATIBILITY

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

- ✓ Cellink BIOX
- ✓ Brinter

For optimal processing, a heated nozzle insulator and cooled print bed is required.

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