



DEGRAD **INX**<sup>®</sup> X100

High Resolution Biodegradable Resin



DEGRAD INX<sup>®</sup> X100 is a polyester-based synthetic resin for multi-photon lithography (MPL) based 3D-printing applications. It is the first ever biodegradable ink that combines the benefits of biocompatibility, flexibility and easy processability resulting in high feature resolutions (< 500 nm).

DEGRAD INX<sup>®</sup> X100 is suitable for the fabrication of 3D complex architectures for tissue engineering applications.

## SUPERIOR SHAPE FIDELITY AT HIGH RESOLUTION

The DEGRAD INX<sup>®</sup> X100 ready-to-use formulations can be processed via a MPL based printer after a short pre-heating process. The resin can be processed at high scanning speeds (up to at least 600 mm/s) which is favorable for shorter fabrication times.

Figure 1 shows DEGRAD INX<sup>®</sup> X100 structures that were printed via MPL technology. Complex and open geometries can easily be printed via DEGRAD INX<sup>®</sup> X100 thanks to its mechanical robustness. The possibility to print structures with feature sizes below 500 nm is favorable for tissue engineering applications as well as systematic investigation of cell-material interactions in 3D.

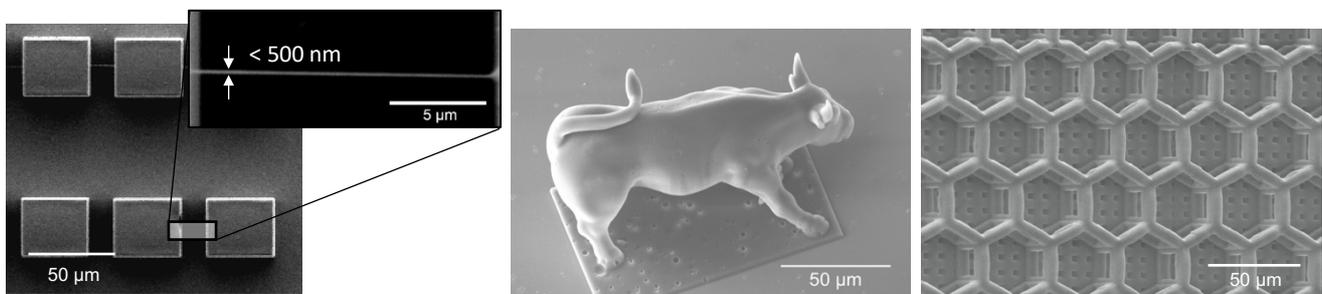


Figure 1: Scanning electron microscope images of the structures printed using DEGRAD INX<sup>®</sup> X100 via multi-photon lithography



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## BENEFITS

- ✓ **Biocompatibility** Exceptional biocompatibility (ISO 10993-5) with no toxic effect on living cells
- ✓ **Biodegradability** Degradable in a long term (3-5 years) when in contact with water or biological fluids
- ✓ **Processability** Easy processing into open and complex architectures with minimal deformation
- ✓ **High resolution** Highest resolution ever reported for a biodegradable material (< 500 nm)
- ✓ **Flexibility** Can generate strong yet flexible structures that are favorable for easy handling and processing
- ✓ **Easy to handle** Provided as ready-to-print formulation in amber vials
- ✓ **Reproducibility** Production under strict quality control to provide a material that delivers every time

## PROPERTIES & PROCESSING

DEGRAD INX<sup>®</sup> X100 is a viscous liquid at room temperature. It provides easy and fast processing given its wide processing window. Stable structures can be printed with DEGRAD INX<sup>®</sup> X100 using laser powers in the range 30-100 mW and scanning speeds up to at least 600 mm/s.

Physical Properties	DEGRAD INX <sup>®</sup> X100
Appearance	Yellow - orange liquid at 20°C
Viscosity (Pa.s)	0.5 - 3
Young's Modulus (MPa)	50 - 60
Ultimate Strength (MPa)	5 - 10
Elongation at break (%)	20 - 30



Upon printing & developing processes, DEGRAD INX<sup>®</sup> X100 results in strong yet flexible structures (Figure 2) with a high deformation energy (900-1000 kJ/m<sup>3</sup>). Compared to the highly rigid and brittle structures of current commercial organic-inorganic hybrids, this feature of DEGRAD INX<sup>®</sup> X100 makes it an excellent candidate for various applications requiring flexibility and easy handling. In addition to these features, DEGRAD INX<sup>®</sup> X100 has a degradation profile similar to the commercial linear poly( $\epsilon$ -caprolactone) (PCL), as observed in degradation tests that were conducted in accelerated conditions (Figure 3).

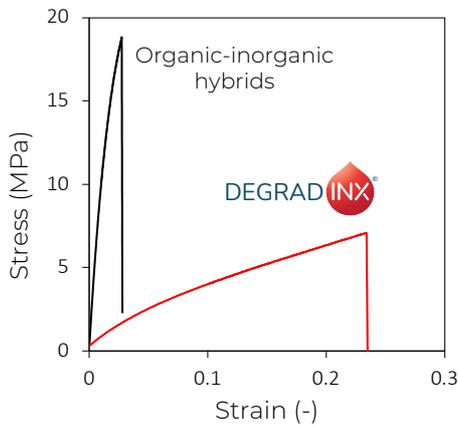


Figure 2: Stress-strain curve of DEGRAD INX<sup>®</sup> X100 after crosslinking

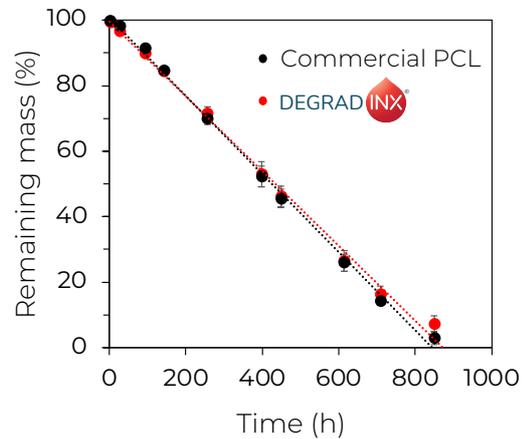


Figure 3: Degradation profile of DEGRAD INX<sup>®</sup> X100 and a commercial PCL tested in accelerated conditions

### BENEFITS OF DEGRAD INX<sup>®</sup> X100

	Organic-Inorganic Hybrids	DEGRAD INX <sup>®</sup> X100
Strength	✓	✓
Flexibility	✗	✓
Biodegradability	✗	✓
Biocompatibility	✗	✓
High resolution	✓	✓
High reactivity	✓	✓



DEGRAD  X100

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### 3D PRINTER COMPATIBILITY

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

- ✓ Uprano NanoOne
- ✓ Uprano 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](mailto:info@bioinx.com)