



GEL-MA INX[®] X-SERIES

The gold standard since 2000

GEL-MA INX[®] X100



GEL-MA INX[®] is a gelatin-based ink exhibiting ideal extracellular matrix-mimicking properties as it is derived from natural collagen, the main component of the natural extracellular matrix. GEL-MA INX[®] is based on gelatin-methacrylamide, originally developed in 2000. Gel-MA derived from gelatin type B shows ideal properties as it is cell-interactive due to the presence of RGD motifs in its backbone. It is biodegradable, can be remodeled by cells, and can be printed by taking advantage of its temperature-dependent physical gelation behavior. It becomes physiologically stable after photo-crosslinking, thereby forming a non-soluble network. As a result of all these beneficial properties Gel-MA has emerged to be one of the gold standards in the field of tissue engineering and biofabrication.

GEL-MA INX[®] X210



With GEL-MA INX[®], the benefits of Gel-MA are combined with a high degree of reproducibility and ease of use by offering the material in ready-to-print cartridges (100-series) or a freeze-dried material in vials (210-series), which are subjected to strict quality control.

BIOLOGICAL APPLICATIONS

Gel-MA INX series is suitable for encapsulation of cells for cartilage and bone regeneration, forming a powerful combination for multi-component osteochondral tissue engineering approach. Hyaline cartilage-like tissue constructs and mineralized tissue/cortical bone have successfully been formed with the use of human induced pluripotent stem cells (iPSCs) and periosteum-derived progenitor cells, respectively. It has been demonstrated that the cell-laden Gel-MA constructs outperformed cell-only counterparts in both *in vitro* and *in vivo* studies.

Read more in following publications:

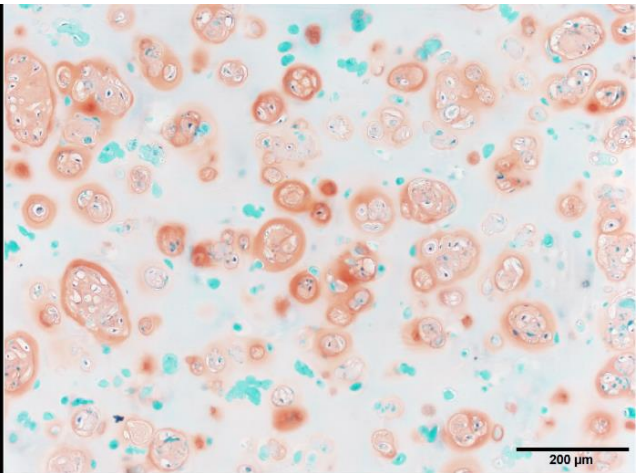
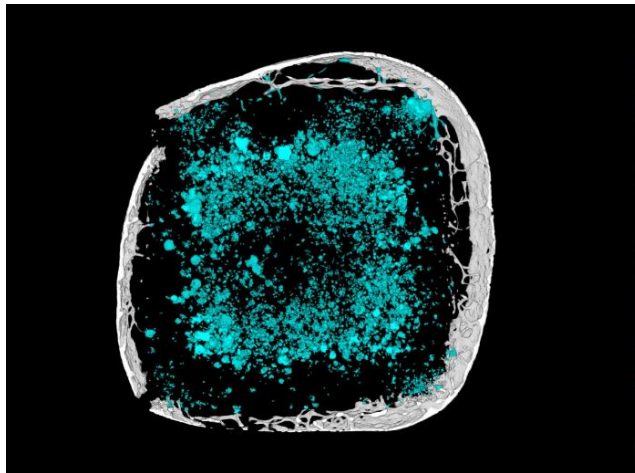
- Agten, H. et al. *Frontiers in Bioengineering and Biotechnology*, 12, 1386692
- Agten, H. et al. *Biotechnology and Bioengineering*, 119, 2950-2963





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Left: Microcomputed tomography (μ CT) rendering of MSCs in GEL-MA INX showing mineralized (green) cartilage and cortical bone (white) Right: Safranin O/Fast Green staining of MSCs in GEL-MA INX showing mineralized (green) cartilage tissue (red)

GEL-MA INX[®] is a very versatile bioink due to its strong resemblance to the natural extracellular matrix and cell interactive behavior. As a result, it has already shown compatibility for a whole range of tissues including blood vessels, adipose, brain, cartilage, bone, connective, skin and ocular tissue. For more information on the biological applications of GEL-MA INX[®] and the parameters used to generate these 3D cellular structures, contact us on info@bioinx.com

Adipose tissue	Blood vessels	Brain tissue	Cartilage	Bone tissue	Skin	Cornea
ASC	HUVEC	Glioblastoma	Chondrocytes	Osteoblasts	HFF	CEnC



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BENEFITS OF GEL-MA INX[®] X-SERIES

- ✓ Biocompatibility Supports cell adhesion and proliferation
- ✓ Biodegradability Enables cellular remodeling of the printed matrix
- ✓ Easy Handling Delivered in a ready-to-use cartridge
- ✓ UV-curable Efficient UV-based crosslinking
- ✓ Reproducibility Production under strict quality control

Table 1: Typical benefits of GEL-MA INX[®] X-SERIES over conventional bioinks

	Conventional Alginate-based bioink	GEL-MA INX [®] X100	GEL-MA INX [®] X210
Temperature-controlled gelation	✗	✓	✓
Cell-interactivity	✗	✓	✓
Biodegradability	✗	✓	✓
Biocompatibility	✓	✓	✓
Shear-thinning	✓	✗	✗

PROPERTIES & PROCESSING

GEL-MA INX[®] is a transparent gel at room temperature, which turns into a liquid after heating above 30°C. Some physical characteristics of GEL-MA INX[®] are listed in Table 2.

GEL-MA INX[®] is a photo-crosslinkable material as shown in Figure 1. This means that after crosslinking, the material becomes physiologically stable, while still being biodegradable. At the end of the irradiation process, the ink exhibits storage moduli in the range of 6 to 15 kPa, meaning that the material exhibits sufficient mechanical integrity to maintain shape retention, while being suitable for a whole range of soft tissue applications.



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Table 2: Physical properties of GEL-MA INX[®]

Physical Properties	GEL-MA INX [®]
pH	6.5 – 8.5
Viscosity (high shear) (Pa.s)	< 10
Total degree of functionalization	70 – 80 %
Storage modulus after UV crosslinking (kPa)	6 - 15

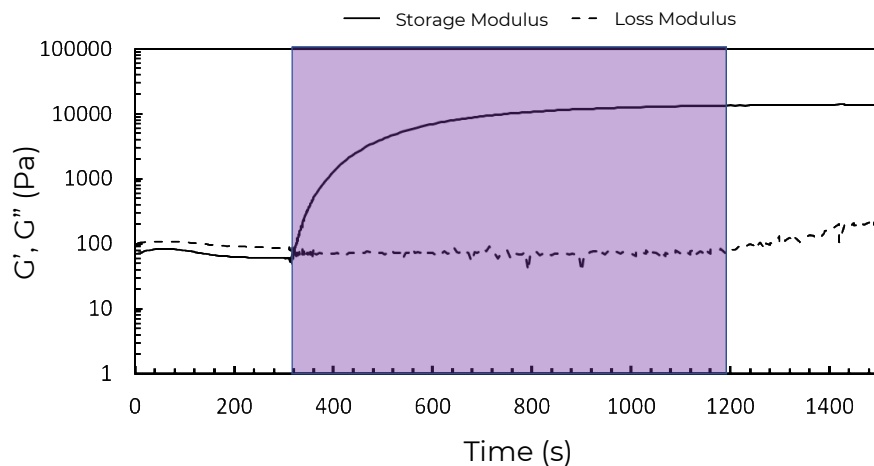


Figure 1: Storage and loss moduli of GEL-MA INX[®] recorded via a rheometer during UV irradiation

3D PRINTER COMPATIBILITY

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

- ✓ Regemat3D
- ✓ FelixBio
- ✓ Cellink BIOX
- ✓ Brinter

For optimal processing, a heated nozzle insulator and cooled printbed are recommended.

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