

# Creating New Markets with an Innovative 3D Gel Printing System

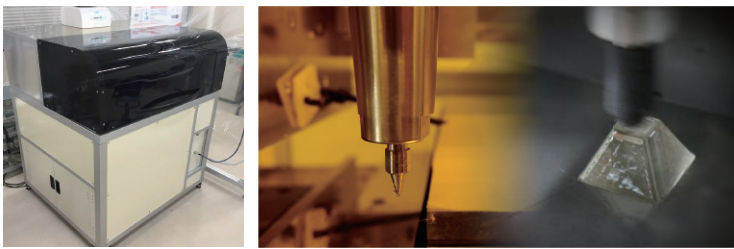
## About this Project

### ■ Developing a 3D gel printer

Gel is a soft material often used in items like batteries and soft contact lenses, and can contain large amounts of water or other liquids. After 2000, new high-strength gels which are overturning the prevailing wisdom that “gel was weak and broken easily” have been developed one after another primarily in Japan. Aiming for the creation of new markets, we have pushed the industrial applications of this new material, and developed three types of 3D gel printers (dispenser-type, resin tank-type, micro stereolithography-type).

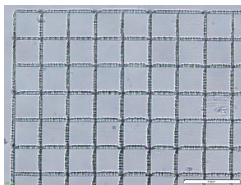


High-strength gel does not break easily even when pushed against



Dispenser-type 3D gel printer

Modeling precision : 500 $\mu$ m Work size : 300×300×200 mm



Micro stereolithography-type 3D gel printer

Modeling precision : 5 $\mu$ m Work size : 35×35×10 mm



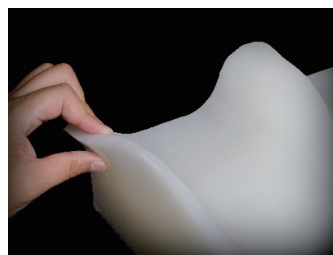
Resin tank-type 3D gel printer

Modeling precision : 100 $\mu$ m Work size : 30×30×20mm

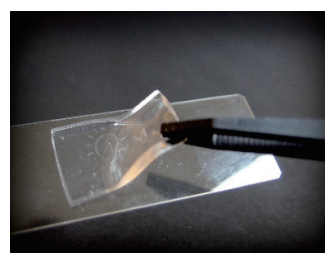
## Test Uses / Application Examples



■ Intraocular lenses



■ Cushions



■ Micro flow channels

■ Bolus

## Research Achievements

### ■Complex models for high-strength gels

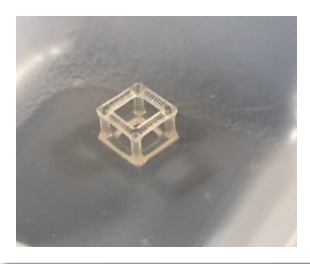
Complex models like hollow-body models have become possible to make with high-strength gels.

### ■Compatible with several different gel materials

Compatible with various gel materials such as ICN (cross-linking) gel, shape memory gel, and DN (double network) gel.

### ■Launched a Spin-out company “D-Light Matter”

Started a university spin-off “D-light matter” to take on prototyping with gel materials.



Hollow-body structure gel models



Model of an intraocular lens using shape memory gel



[www.d-lightmatter.com](http://www.d-lightmatter.com)

## Future Outlook

### ■Creating new devices and new services in the medicine and robotics fields

We aim to create new markets in the regenerative medicine and robotics fields by producing gel-based 3D cell scaffolding, robotic hands, micro flow channels and blood vessels.



Finger model with bone



Kidney model



Prosthesis mounted with Gel-Fingertip

### ■Developing a database that supports 3D gel modeling

We are continuing progress on constructing a database to optimize model parameter settings.

### ■Creating new industries with gel models

D-lightmatter's client service team supports the development of new products that use gel industrially, and the creation of new gel material industries.

### ■Holding the Soft 3D Co-creation Consortium in collaboration with Yamagata University and manufacturing companies

The consortium provides a space for open exchange and joint creation for the industries of many fields, including gel, robotics, medicine, mobility, and food products. The consortium aims for the fusion and progress of new industrial fields.



Research Theme : Revolutionary 3-D Printing Systems of Designable Gels to Develop Novel Applications and Markets

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