

## Product Information

**TissueFab™ - Sacrificial Bioink, suitable for 3D bioprinting applications**

Protocol for Catalog No. [906905](#)

### Introduction

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TissueFab™ - sacrificial bioink is a ready-to-use bioink that is formulated for printability and is designed for extrusion-based 3D bioprinting. Sacrificial Bioink can be used with most extrusion-based bioprinters, and is used to create complex negative geometries within a structure, such as void channels, empty space, microfluidic channels for organ-on-a-chip fabrication, or vascular-like structures within an engineered tissue. Moreover, Sacrificial Bioink can provide temporary support during the bioprinting process. Once bioprinting and any crosslinking of the tissue matrix are complete, Sacrificial Bioink can be easily removed by liquifying and washing it away with cold PBS (2-8 °C). In combination with other crosslink-ready bioinks, TissueFab™ - sacrificial bioink enables the precise fabrication of 3D cell models and tissue constructs for research in 3D cell biology, tissue engineering, in vitro tissue models, and regenerative medicine.

#### Disclaimer

TissueFab™ - Sacrificial Bioink is for research use only; not suitable for human, animal, or other use. Consult the Safety Data Sheet for information regarding hazards and safe handling practices.

### Specifications

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<b>Storage</b>	Store TissueFab™ - Sacrificial Bioink at 2 - 8 °C.
<b>Stability</b>	Refer to the expiration date on the batch-specific Certificate of Analysis.

### Materials

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#### Materials supplied

The TissueFab™ - Sacrificial Bioink is supplied as follows:

Catalog Number	Quantity
906905	1 × 10 mL bottle (1 unit)

## Materials required, but not supplied

- PBS (Cat. No. [D8537](#))
- Sterile tube for reagent preparation
- Sterile pipette tips for transferring bioink
- Sterile printing cartridge, piston, and nozzle/needle for 3D printing
- Extrusion-based 3D bioprinter
- Ice bath or cold ice pack

## Before you start: Important tips for optimal bioprinting results

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**Optimize printing conditions.** Optimize printing conditions (e.g., nozzle diameter, printing speed, printing pressure, temperature) for the features of your 3D printer and for your application to ensure successful bioprinting. The suggestions below can guide you.

**Reduce bubble formation.** If the bioink has air bubbles, the bubbles may hamper bioprinting. Carefully handle the bioink when you mix and transfer it to avoid bubble formation. Do not vortex or shake vigorously.

**Aseptic techniques.** Follow standard aseptic handling techniques when you prepare and print the bioink, and during cell culture.

**Note:** The number of prints obtained from each 10-mL bottle of bioink (a unit) will vary depending on the structure that is printed. For example, each 10-mL bottle contains enough material to print a 30- $\mu$ L structure in each well of three 96-well plates or a 100- $\mu$ L structure in each well of four 24-well plates.

## Procedure

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### A. Prepare bioink

1. Chill the 10-mL bottle of TissueFab™ - sacrificial bioink in a refrigerator or in an ice bath or on an ice pack for 30 minutes or until the bioink becomes fluid so that it is easy to pipette. The bioink will start to gel at temperatures warmer than 10° C. The bioink is stable for at least 7 chilling-refrigeration cycles.
2. When the bioink has become fluid, gently invert the TissueFab™ - sacrificial bioink bottle 5–10 times to make a homogeneous solution. Avoid creating air bubbles. DO NOT vortex or shake vigorously.

### B. Prepare bioink printing cartridge

1. Pipette the bioink solution into the desired printing cartridge. This step creates a filled printing cartridge.
2. Return the remaining bioink to the 4 °C refrigerator for storage.

### C. Bioprint

1. Let the filled cartridge sit at room temperature for at least 15 minutes to induce gelation.
2. If your bioprinter has a temperature controlled print bed, set the temperature to 20 °C.
3. Follow the manufacturer's 3D printer instructions. Load the print cartridge onto the 3D printer and print directly onto a Petri dish or into multi-well plates. Adjust the flow rate according to the nozzle diameter, printing speed, printing pressure, and temperature. TissueFab™ - Sacrificial Bioink can be printed simultaneously with other cell-containing bioinks by using separate print heads in the bioprinter.

### **Example**

*Printer: Cellink BIO X™ or Cellink INKREDIBLE™ printer*

*Temperature: 25 °C*

*Flow rate (speed): 10 mm/s*

*Nozzle: 22G TT tapered needle*

*Pressure: 50-60 kPa*

### **D. Remove Sacrificial Bioink post-printing.**

After printing is completed and any tissue construct is crosslinked, remove the Sacrificial Bioink. Place the construct in a 4 °C refrigerator. While refrigeration time will depend on the volume of the construct, typically, the Sacrificial Bioink will liquefy after 2–5 min refrigeration.

Rinse the construct or perfuse the channels with cold PBS (2-8 °C) to remove the liquified Sacrificial Bioink from the construct.

### **E. Culture cells.**

Culture the bioprinted tissue with the appropriate cell culture medium following standard tissue culture procedures.

## **Troubleshooting**

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### **1. Air bubble is trapped in the middle of bioink in the cartridge.**

Possible reason – Air bubble was created when the bioink was transferred.

Solution - Chill the cartridge at 4 °C for 5–10 minutes or until the bioink becomes fluid. Turn the cartridge so that the tip faces up to allow any air bubbles to exit from the tip of the cartridge. Gently tap the cartridge to help the air bubbles pass through the tip.

### **2. Printed structure spreads and does not hold its shape.**

Possible reasons – Bioink was not gelled sufficiently before printing; or the printing pressure is too high.

Solution – Do not dilute the bioink. Make sure the bioink has been warmed (let sit at room temperature for 15 minutes) according to the instructions before printing. Adjust printing pressure to achieve sufficient flow of bioink.

### **3. Interrupted flow or no flow during printing.**

Possible reason – Insufficient printing pressure or nozzle is partially or fully clogged.

Solution – Adjust the printing pressure to achieve sufficient flow of bioink. If the problem persists, change the nozzle.

### **4. Printed sacrificial structure did not remove.**

Possible reason – Insufficient cooling, insufficient rinsing/washing.

Solution – Make sure that the construct is refrigerated and rinsed or perfused according to the instructions.

## Related Products

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Name	Cat. No.
TissueFab™ - GelAlg-UV bioink	<a href="#">905410</a>
TissueFab™ - GelAlg-Vis bioink	<a href="#">906913</a>
TissueFab™ - GelMA-UV bioink	<a href="#">905429</a>
TissueFab™ - GelMA-Vis bioink	<a href="#">906891</a>

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