

# Corning® Matribot® Bioprinter

CORNING

## Demo Protocol Experiment 3: Printing in a dish using Corning Start sacrificial ink

### Introduction

The aim of this protocol is to provide instructions for bioprinting single-layer geometries with Corning Start sacrificial ink (non-sterile) using the Corning Matribot bioprinter. This document covers bioprinting parameters and procedures for bioprinting in a Petri dish.

For more details on operating the Corning Matribot bioprinter, please refer to the Corning Matribot Bioprinter Instruction Manual (CLS-AN-641DOC).

### Materials

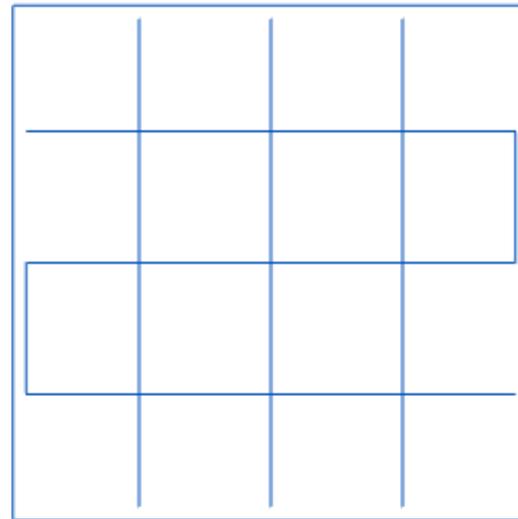
- ▶ Corning Start sacrificial ink (non-sterile), 2.7 mL/syringe (Corning 6158)
- ▶ Corning Matribot bioprinter (Corning 6150)
- ▶ 3 mL syringe with BD Luer-Lok™ tip (BD 309657)
- ▶ Corning standard conical bioprinting nozzles, 22G-410 μm (blue; Corning 6167)
- ▶ Corning 100 x 15 mm Petri dish with cover (Corning 70165-101) or Corning 100 x 10 mm Petri dish with cover (Corning 70165-100)

### Protocol

Step	Title	Material	Description
1	Set Printhead and Printbed temperatures	<ul style="list-style-type: none"><li>• Corning Matribot bioprinter</li><li>• Computer with Corning DNA Studio software</li><li>• 100 x 10 mm or 100 x 15 mm Petri dish</li></ul>	<ul style="list-style-type: none"><li>• Connect the printer to the computer using the provided USB cable.</li><li>• Turn on the Matribot bioprinter using the power switch.</li><li>• Open the latest version of Corning DNA Studio.</li><li>• Connect to the printer.</li><li>• Place a Petri dish (without a cover) on the printbed.</li></ul>
2	Set bioprinting parameters	<ul style="list-style-type: none"><li>• Corning DNA Studio software</li></ul>	<ul style="list-style-type: none"><li>• Use Corning DNA Studio software to create a Bioprint project.<ul style="list-style-type: none"><li>- Select Bioprint from the software toolbar and select the STL file provided for the demo Square_20mm.stl.</li><li>- In the Surface tab, select Petri dish.</li><li>- In the Printhead tab, set Bioink to Corning Start sacrificial ink (non-sterile), and confirm that the printhead parameters match the parameters in Table 1.</li><li>- In the Layers tab, select the layer parameters according to Table 1 and Figure 1.</li></ul></li><li>• Select Print on the software toolbar when complete. Click OK on the pop-up window to proceed to the printing page.</li></ul>
3	Load the syringe	<ul style="list-style-type: none"><li>• Corning Matribot bioprinter</li><li>• 3 mL syringe of Corning Start sacrificial ink (non-sterile)</li><li>• Standard conical bioprinting nozzle, 22G-410 μm</li></ul>	<ul style="list-style-type: none"><li>• Remove air bubbles from the syringe by tapping the syringe, and replace the syringe cap with a 22G nozzle. Push on the plunger to remove air until the Start ink reaches approximately halfway through the nozzle.</li><li>• Place the loaded syringe into the printhead.</li><li>• Rotate the syringe counterclockwise until the syringe tabs are locked in place.</li><li>• Adjust the position of the syringe plunger holder arm by navigating on the LCD interface to Prepare Bioprint. Select Raise Plunger to raise the plunger arm to its maximum height, and use Extrude Volume to lower the plunger arm until it aligns with the height of the syringe plunger.</li><li>• Rotate the syringe plunger holder arm over the syringe plunger.</li><li>• Extrude 30 μL using the Extrude Volume function on the device's LCD interface in the Prepare Bioprint menu. Hold a lab tissue under the bioprinting nozzle to catch the extruded material.</li></ul>
4	Machine calibration (automatic)	<ul style="list-style-type: none"><li>• Corning Matribot bioprinter</li><li>• Corning DNA Studio software</li></ul>	<ul style="list-style-type: none"><li>• In Corning DNA Studio, click Calibrate and select Automatic Calibration.</li><li>• Perform automatic calibration by following the steps displayed in Corning DNA Studio.</li><li>• Perform machine calibration each time a new syringe is placed in the printhead or a new plate type is used.</li></ul>
5	Nozzle priming	<ul style="list-style-type: none"><li>• Corning Matribot bioprinter</li></ul>	<ul style="list-style-type: none"><li>• Immediately before each print, prime the nozzle by extruding 2 to 3 drops. Wait until the material stops flowing out of the nozzle. Priming can be performed either by selecting the droplet icon in the software printing window or by extruding 1 μL increments by using the Extrude Volume function on the LCD interface. If any material has gelled at the tip of the nozzle, ensure it is fully extruded prior starting a print.</li></ul>
6	Printing	<ul style="list-style-type: none"><li>• Corning Matribot bioprinter</li><li>• Corning DNA Studio software</li></ul>	<ul style="list-style-type: none"><li>• In Corning DNA Studio, press Start to begin the bioprinting process.</li></ul>

**Table 1.** Recommended printhead settings used for bioprinting with Corning® Start sacrificial ink (non-sterile), using the Bioprint feature on the Corning Matribot® bioprinter.

Printhead Parameters	
Nozzle	0.41 mm
Speed	5 mm/s
Preflow volume	30 µL
Extrusion rate	2.7 µL/s
Retract volume	30 µL
Z-offset	0.4 mm
Extra preflow volume	3 µL
Infill extrusion multiplier	100%
Retract rate	25 µL/s
Extra retract	30 µL
Postflow stop time	0.3 s
Z-lift	3.0 mm
Layers Parameters	
Density	18%
First layer height	66%
Layer height	0.41 mm



**Figure 1.** Layer view with correctly set infill parameters.

**NOTE:** This is only a recommended reference of starting parameters. The actual values needed to print will vary depending on the preparation procedures as well as the print surface.

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