

Application Note

GelMA HIGH

Description

This bioink is made of highly concentrated buffered GelMA (20% w/w) at physiological pH and osmolarity. Dilute our GelMA solution to reach the desired concentration, add a photoinitiator or any special additive and, as a result, tailor your own GelMA-based bioink for 3D cell culture or casting applications. Warm it up, mix it well and make an impact. Preparing GelMA has never been quicker!

Application

GelMA is compatible with most mammalian cells. It can be utilized as a base material for a wide range of tissues. This bioink has been optimized for use with the BIO X system and temperature controlled printhead with thermal nozzle cover and the use of a cooled printbed. While the bioink can be used with the INKREDIBLE+ system due to its ability to heat the bioink, secondary steps are necessary to cool the printed structure to pre-gel it prior to crosslinking. Clogging may still occur due to lack of temperature control at the nozzle. Therefore, it is not recommended to use the bioink with the INKREDIBLE system since the bioink will not perform as expected and resulting filament characteristics may be inconsistent.

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Storage

GelMA HIGH should be stored at four and eight degrees Celsius. Protect the bioink from light and avoid temperature fluctuations. The shelf life of GelMA HIGH is six months. The valid expiration date is always stated on the package. Ensure the cartridges are capped prior to storage to prevent drying. Keep GelMA HIGH unfrozen – placing GelMA HIGH in the freezer risks impairing its printability.

Mixing with Cells

It is recommended to warm up the GelMA to 37 degrees Celsius prior to mixing with cells. We suggest mixing GelMA with cell culture media or PBS containing a high concentration of cells to minimize bioink dilution. Then cool down to 26 degrees Celsius to print. See the *Mixing Cells Protocol GelMA series* for more details.

Crosslinking

It is recommended that after printing, the printbed temperature is reduced to 10 degrees Celsius or the print is placed briefly on ice to stabilize the GelMA prior to photocrosslinking.

Printing Parameters

Layer height should be set to the nozzle inner diameter. Optimal printing temperature is at 26 degrees Celsius, which is just above the gel point temperature.

GelMA is very sensitive to the thermal environment during printing. After thermal reset, i.e. heating the ink at 37 degrees Celsius, GelMA can be printed at 26 degrees Celsius. If the GelMA cartridge becomes thermally gelled, it is recommended to reheat the bioink to reset the chain entanglements again.

Printability Observations

Printing with GelMA results in a larger filament diameter compared to the diameter of the extrusion nozzle. To achieve a smaller filament diameter, we recommend that GelMA is printed at faster printing speeds and lower pressures.