



ECM-BioInk™ Datasheet

1. PRODUCT DESCRIPTION

ECM-BioInk™ is a peptide nanofiber 3-dimensional scaffold that promotes cell growth and migration. It utilizes specific peptides that self-assemble from ECM-BioInk™ fluid precursors into highly intertwined hydrated peptide hydrogel fibres when presented with ionic strengths. By inducing a rapid transformation from solution to gel, a peptide nanofiber scaffold is generated. Adjusting the concentration of the ECM-BioInk™ solution, researchers can control the flexibility of the 3-D architecture to meet their applications specific needs. ECM-BioInk™ is the unique human relevant synthetic extracellular matrix where scaffold interaction with cells and small molecules is driven by hydrogen and hydrophobic interactions. We offer an ECM-BioInk™ portfolio with 5 formulations that differs from the cell-scaffold interactions (scaffold positive electrical net charge ranging from 0 to +2) as well than the simple tuning of the synthetic extracellular-matrix mechanical strength.

Cell response to material depends on a number of variables which include: Cell type (line of stem), nature of material (functional or non-functional) as well as cell response targeted (spheroids vs. sheets). As a result the matrix requirement will vary.

ECM-BioInk™ technology platform can be further functionalized with further biological and chemical cues to develop the perfect printable matrix for your application.

Type	Ref. #/ Order#	Product Specifications	
ECM- α BioInk™	900-011-708	v/W ratio: pH: G' (24h in PBS): Electrical charge:	2% peptide/98% water 4.0 – 4.5 10 kPa @ 1 rad·sec ⁻¹ medium (M)
ECM- β BioInk™	900-011-709	v/W ratio: pH: G' (24h in PBS): Electrical charge:	2% peptide/98% water 4.0 – 4.5 12 kPa @ 1 rad·sec ⁻¹ medium (M)
ECM-c BioInk™	900-011-710	v/W ratio: pH: G' (24h in PBS): Electrical charge:	2% peptide/98% water 4.0 – 4.5 12 kPa @ 1 rad·sec ⁻¹ low (L)
ECM-f BioInk™	900-011-711	v/W ratio: pH: G' (24h in PBS): Electrical charge:	2% peptide/98% water 4.5 – 5.0 10 kPa @ 1 rad·sec ⁻¹ low (L)
ECM-p BioInk™	900-011-712	v/W ratio: pH: G' (24h in PBS): Electrical charge:	3% peptide/97% water 6.5 – 7 15 kPa @ 1 rad·sec ⁻¹ high (H)

2. INTENDED USE

ECM-BioInk™ has been shown to support improved growth and migration in the proliferation of many cell types, including neural stem cells, neurons, glia, astrocytes, fibroblasts, cardiomyocytes, osteoblasts and chondrocytes. A selection table can be found below.

Cell Type	ECM- α BioInk™	ECM- β BioInk™	ECM-c BioInk™	ECM-f BioInk™	ECM-p BioInk™	Experiment
Fibroblasts	x	x	x	x	x	Proliferation, Migration
Human Embryonic Stem Cells	x	x	x	x	x	Proliferation, Differentiation
Human Induced Pluripotent Stem Cells	x	x	x	x	x	Proliferation, Differentiation
Human Mesenchymal Stem Cells	x	x	x	x	x	Proliferation, Differentiation
Bone Marrow Derived Mesenchymal Stem Cells	x	x	x	x		Proliferation, Differentiation
Adipose Tissue Derived Mesenchymal Stem Cells	x	x	x	x		Proliferation, Differentiation
Human Haemopoietic Stem Cells	x	x	x	x		Proliferation, Differentiation
Human Neuronal Stem Cells	x	x	x			Proliferation, Differentiation
Cardiac Progenitor Cells	x	x	x	x	x	Proliferation, Differentiation
Human Endothelial Cells	x	x	x	x	x	Proliferation, Migration
Primary Neurons	x	x	x			Proliferation, Migration
Cardiomyocytes	x	x	x			Proliferation, Migration
Nucleus Pulposus Cells	x	x	x			Proliferation, Migration
Hepatocytes	x	x	x	x		Proliferation, Migration
Chondrocytes	x	x	x			Proliferation, Migration
Myocytes	x	x	x			Proliferation, Migration

3. PREPARATION NOTE

This product is supplied as a ready-to-use cartridge for 3DDiscovery™ and BioFactory® bioprinters containing 3 mL (3cc sterile) of formulated ECM-BioInk™ pre-gel solution. It is delivered with a standard 2% (w/v) peptide content. Dilution will lead to a softer gel that is more suitable for cell migration and angiogenesis. In aqueous solution, ECM-BioInk™ has a pH of 4.0-4.5. Cells, bioactives or other fluids can be added directly without prior addition of a buffer or medium.

We offer two routes for premixing:

- Manual using conventional laboratory hardware
- Using CELLMIXER, a specifically designed mixing device that simplifies the mixing process and offers a homogeneous suspension with increased cell viability.

Both routes shall be performed under sterile conditions.

ECM-BioInk™s are formulated so as to provide peptidic nanofiber based viscous solutions. The low energy storage modulus has been engineered to allow facile cell encapsulation without precipitation and stress at the cellular level. Those ready to print matrices offer cell friendly environments and allow for high aspect ratio structures. The ECM-BioInk™ develops their final mechanical strength when in contact with physiological level salt concentration, i.e. 120-150 mM as present in cell culture media or saline solutions. No further salt addition is necessary to form the gel.

Once the hydrogel has formed, do not attempt to mix the gel any further, as this risks to destroy the hydrogel integrity. Manipulation of the cells should be carefully performed to avoid disruption of the scaffold.



Manual Mixing with Laboratory Tools

- Tools needed (all should be sterile):
- Micro-spatula
- Cells suspension
- Small container for mixing (e.g. petri-dish)
- A cartridge and a piston

Harvest the cells and count them. We advise a cell concentration of approximately $20 \cdot 10^6$ cells/ml

- The mixing ratio is 1:10. For 1 ml of ECM BioInk™ mix 100 µl of cell suspension in media
- Dispense the two amounts together and gently mix them with the micro spatula until you obtain a homogenous suspension.
- Fill the cartridge with the mixed suspension. Push to the bottom of the cartridge with the use of the piston. Be careful not to have air bubbles in your suspension
- To remove trapped air, centrifuge at appropriate speeds

Using Cellmixer

Refer to instruction of use provided with CELLMIXER

4. PRINTING PARAMETER

Type	Extrusion Pressure [MPa]	Deposition Velocity [mm/s]	Dosing Distance [mm]	Valve opening time [µs]	Temperature [°C]
ECM-α BioInk™	0.05	15	0.1	110	RT
ECM-β BioInk™	0.065	15	0.1	110	RT
ECM-γ BioInk™	0.065	15	0.1	110	RT
ECM-f BioInk™	0.05	15	0.1	110	RT
ECM-p BioInk™	0.05	15	0.1	110	RT

5. STORAGE CONDITIONS

Store in a cool, dark and dry place.

6. FIRST AID MEASURES

6.1 Potential Health Effects	
6.2 Eye	In case of contact with eyes, flush with copious amounts of water for at least 15 minutes.
6.3 Skin	Assure adequate flushing by separating the eyelids with fingers. Call a physician.
6.4 Ingestion	If victim is conscious and alert, wash out mouth with water. Induce vomiting if large amounts are ingested. Do not give anything by mouth to an unconscious person. Call a physician.
6.5 Inhalation	If exposed, remove victim from exposure and move to fresh air immediately. If breathing becomes difficult, call a physician.
6.6 R and S-Phrases	R21-25, 36 : S3, 12, 26, 20/21, 24/25, 27/28, 36/37/38