Questions

(click on the question to navigate to the answer)

What are RASTRUM™ Hydrogels?

RASTRUM Hydrogels are a printable, synthetic hydrogel system, comprising a large library of matrix environments by tuning combinations of:

- A PEG-based backbone, which can be tailored to tune mechanical properties of the hydrogel
- Tethered adhesion peptide sequences
- MMP-sensitive crosslinks
- Full-length proteins

How do RASTRUM™ Hydrogels gelate?

Gelation occurs instantly upon the combination of two droplets deposited from independent print nozzles - one drop of RASTRUM Activator and one drop of RASTRUM Bioink.

RASTRUM Activator is an aqueous peptide-based cross-linking solution which interacts with the RASTRUM Bioink to form a hydrogel. The user resuspends cells in Activator solution prior to loading into RASTRUM, so when Bioink and Activator combine to form hydrogel, cells are encapsulated within.

This two-component system is key to the formation of controlled 3D hydrogels using a drop-on-demand approach. In this way, we do not need to rely on temperature- or UV light-induced gelation.

Can RASTRUM™ print any hydrogels?

RASTRUM will only operate with validated RASTRUM Hydrogels. Our hydrogel components exhibit optimal biochemical properties for drop-on-demand dispensing and printing parameters are optimised by our engineers to build a robust 3D structure. RASTRUM takes this optimisation effort away from the user so that you can focus on the biology.

What is the benefit of RASTRUM™ Hydrogel over natural hydrogels (i.e. Matrigel)?

Natural hydrogels are more susceptible to batch-to-batch variation, lack of physical/biochemical modularity, and can be difficult to handle manually. Synthetic hydrogels can overcome some of these limitations, providing a reproducible and more tunable system

than natural gels. Our library of RASTRUM hydrogels are completely synthetic and can be precisely tuned to exhibit a variety of mechanical and biofunctional properties.

What are the mechanical properties exhibited by RASTRUM™ hydrogels?

RASTRUM Hydrogels can be biochemically fine-tuned to exhibit a stiffness suitable for the mechanical support of 3D cell growth. We support hydrogels with a mechanical stiffness range (G') between 0.5 - 3.5 kPa.

What are the biofunctional properties exhibited by RASTRUM™ hydrogels?

RASTRUM Hydrogels exhibit covalently tethered adhesion peptides - the core integrin binding sequences found in the most common extracellular matrix proteins - to the PEG backbone of RASTRUM Hydrogel, enabling cell attachment to and interaction with the matrix.

Additionally, we crosslink the hydrogel with a matrix metalloproteinase (MMP)-sensitive peptide sequence, enabling hydrogel remodelling by cell-secreted proteases.

It is also possible to include full-length proteins (such as collagen and laminin) into RASTRUM Hydrogels.

Are the hydrogels stable over time in culture?

Most RASTRUM Hydrogels are designed to be degraded and remodelled by the action of cell-secreted proteases. This means that as the cell model matures (and potentially excretes its own ECM), the printed hydrogel will soften. If it is necessary that a particular model be stable over longer culture periods, a portion of non-cleavable crosslinker can be incorporated into the hydrogel to prevent degradation and retain gel stability.

Can the hydrogel formulation (activator and bioink) be used again once it has been thawed?

Re-freezing is not recommended as this would compromise product stability.

What is the shelf life of the bioink and activator?

The bioinks and activators are stable for approximately 6 months from the shipment date (or until the expiration date) and should always be stored at -20°C.