Gelacell™ 3D Microfibrous Scaffold

Bringing cell culture to the next dimension

Product Description

Gelacell™ is a unique, 3D microfibrous scaffold specifically engineered for advanced in vitro 3D cell culture and tissue engineering applications. Designed as a non-woven, highly porous scaffold, Gelacell™ offers exceptional biocompatibility and non-toxicity across a variety of cell types. Our specially integrated circular scaffolds in a well plate format (as shown in Figure 1) offer a straightforward visual imaging of cells directly from the well plate.

Perfectly tailored for the cultivation of complex systems like organoids, cell microenvironments, and tissue regeneration, Gelacell™ also makes a robust platform for drug screening and other cell culture investigations. The scaffold's optimized design ensures thermal, chemical, and mechanical stability, while providing substantial swelling capabilities and porosity for efficient nutrient diffusion and cellular waste build up prevention.

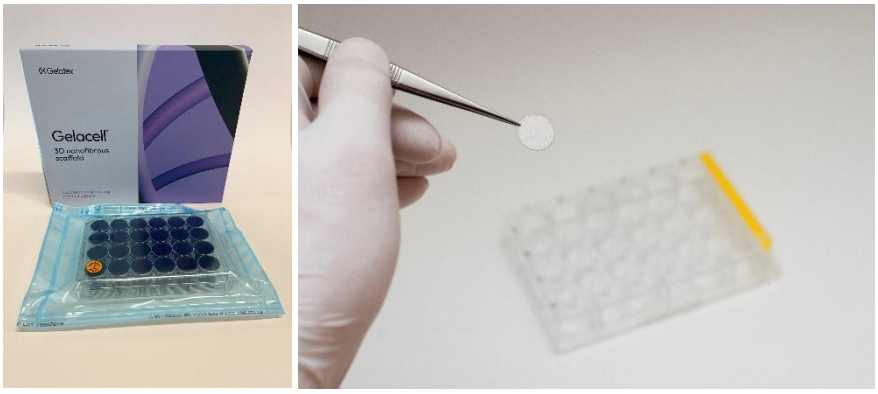

Figure 1: Gelacell™ scaffolds incorporated in the well plate

Product Features

- 3D architecture with a substantial available surface area.
- Minimal modifications required for transitioning from 2D to 3D culture.
- Stable mechanical properties.
- Scaffolds are affixed to transparent, inert discs for easy handling.
- High porosity promotes cell migration and efficient diffusion of nutrients, solutes, and gases.
- Compatibility with a variety of cell lines and culture conditions.
- Direct analysis of cell morphology and behavior under a fluorescence microscope.
- Sterilized by Gamma irradiation and remains sterile until the pack is opened.
- Storage at room temperature.

Product Datasheet

Product code: GC0805RN-WP24-A

Product information	Gelacell™
Product code	GC0805RN-WP24-A
Polymer	Poly-L-lactide (PLLA) (pharmaceutical grade)
Appearance (dry)	White
Appearance (swelled in water/PBS)	White (Translucent)
Fiber orientation[1]	Randomly aligned in a 3D morphology
Fiber appearance[1]	straight to curly
Fiber diameter[1]	2.0 µm - 2.6 µm
Thickness	137 µm - 200 µm
Area density	4 g/m^2 - 5 g/m^2
Porosity[2]	≅ 90%
Wettability[3]	Hydrophilic The material uptakes water, and compounds that dissolve in water due to the porosity and capillary forces wherever the material is soaked in a solution and incubated.
Swelling in PBS (pH 7.4 at 37°C)[4]	806% ± 66% The material was kept soaked for 24 hours in PBS at 37°C
Degradation (in PBS at 37°C)[4]	Negligible
pH (of PBS solution after 24 hours)[4]	7.4 – 7.5 without observable changes
%Elongation[5]	25% ± 2.78%
Modulus[5]	1046 kPa ± 157 kPa
Ultimate stress[5]	190 kPa ± 22 kPa

Note:

1. This information is derived from SEM images.
2. Porosity is determined by using the volumes of scaffolds and PLLA.
3. Wettability is determined by visual observation when water/PBS was added dropwise on top of the scaffolds after washing the scaffolds with 70% ethanol. Ethanol washing is highly recommended as PLLA is inherently hydrophobic in nature.
4. The degradation and swelling tests were performed gravimetrically in PBS solution. Swelling measures the uptake of solution and degradation indicates the decrease in weight over time while PBS was changed after every two days interval.
5. The tensile measurements were performed according to an in-house protocol and in a dry state.

Standard Operating Procedure

Gelacell unpacking and sterilizing

1. Adhering to aseptic techniques, place the Gelacell™ package under a laminar flow hood and carefully remove the well plate and blue tops (Figure 2).

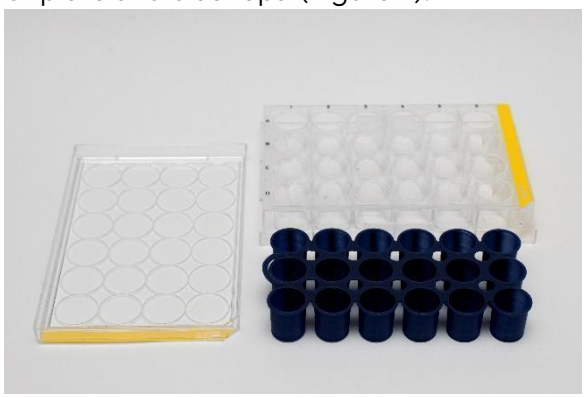

Figure 2: Unpacking Gelacell™ and removing the blue tops.

2. The production of Gelacell takes place in clean rooms ISO Class 7 conditions and the products are sterilized by Gamma irradiation. UV sterilization for 20 minutes is advisable to retain sterility of the product upon unpacking.

Note: The scaffolds are expected to remain unchanged under standard UV-C radiation dosage. Higher irradiation doses should be used with caution.

Cell seeding and culture

1. Before cell seeding, wash the scaffold once with 70% ethanol, followed by a rinse with PBS solution three times.
2. Pre-swell the scaffold with your preferred cell culture media (with/without serum). Add 200 - 300 µl of media onto the scaffold, incubate for 30 min to 1 hour, and aspirate the spent media.
3. Dispense your desired concentration of cell culture suspension with complete media onto the scaffold. The recommended cell seeding density ranges from 10^4 to 10^6 cells/well, but the exact figure will depend on the cell type and the planned duration of cell culture.
4. Place the well in a CO2-incubator at 37°C for 0.5 - 2 hours to allow initial cell adhesion. Afterward, gently fill the well with the medium without dislodging the cells that have already adhered to the scaffold. Incubate for 24 hours to ensure complete cell adhesion to the scaffold.
5. [Optional] Evaluate cell adhesion under a microscope after incubation and increase the media volume to provide an appropriate medium for cell culture.
6. It's recommended to exchange media roughly every 48 hours; however, this may vary depending on the cell line, media, and cell density. Aspirate the waste media from the sides of the well and carefully add fresh media on top of the scaffold without dislodging the adhered cells. Continue media exchange throughout the cell culture period.

Note : The rate and efficiency of cell attachment and detachment can be affected by temperature, pH, nutrient exchange, the concentration of cells, enzymatic degradation, and cell staining. The above guideline is the best known practices based on the tests carried out on the scaffolds. The cell seeding volume is preferred to be in between 10 to 70 µm to achieve total cell adhesion and avoid cell losses. However, this seeding volume is not restricted for lower ($< 10^4$) or higher ($> 10^6$) seeding density, except the performance of cell adhesion might differ.

Cell culture analysis

1. **[Optional] Cell fixation:** Rinse the scaffolds with PBS, and use 3.7% - 4% formaldehyde or paraformaldehyde for cell fixation. Leave the scaffolds in the solutions for 15 min at room temperature or in a CO2-incubator.
2. **For cell viability:** Use assay tests such as MTS, MTT, CCK-8, etc. Follow the standard protocols suggested by the manufacturer.
3. **For cell staining and imaging:** Use stains (e.g., calcein, FDA, phalloidin-conjugates, DAPI, propidium iodide) alone or in combination to achieve better contrast when imaged. Cells can be visualized either directly putting the well plate under microscope or switching the scaffolds on a glass slide. However, the second option is highly recommended for better handling and imaging.
4. **Handling:** Use fine point tweezers (straight or angled) to hold the discs (see Figure 1), and place the discs on a glass slide containing one or two drops of mounting media to fix the discs (Figure 3).
5. **Imaging:** Evaluate the scaffolds under a fluorescence or confocal microscope for imaging and visualization.

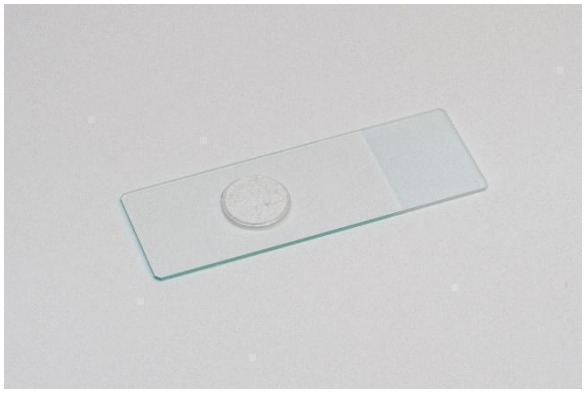

Figure 3: Fix the Gelacell discs using mounting media for imaging.

Note : The method of cell/tissue culture analysis on the scaffold may vary based on the tests and applications. The above guidelines are based on the tests conducted on the scaffolds. However, users are advised to extend the scope of analysis as per their requirements.

Important Information:

- The scaffold is compatible with both serum and serum-free cultures.
- The transparent discs are not fixed to the wells. Handle with care when transferring or changing solutions in the wells to prevent flipping the discs. Avoid forceful pipetting.
- Avoid scratching the scaffold discs while using micropipettes. When pipetting solutions from/into the well, place the tip at the well's periphery to avoid contact with the scaffold.
- Specificity and autofluorescence can cause issues with contrast, but choosing the optimal stain as well as tuning and adjusting the object and intensity of the fluorescence will assist in reaching the desired result.
- Sterility and performance properties are maintained when stored at room temperature, with a shelf life of two years from the date of manufacture.

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