

TECH OFFER

Keratin Templates Derived from Hair and Feathers for Biomedical Applications



KEY INFORMATION

TECHNOLOGY CATEGORY:

Sustainability - Circular Economy

Healthcare - Pharmaceuticals & Therapeutics

Life Sciences - Industrial Biotech Methods & Processes

TECHNOLOGY READINESS LEVEL (TRL): **TRL4**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO175113**

OVERVIEW

We have developed a variety of keratin templates for the healthcare sector namely sponges as tissue fillers, gels for wound healing, sutures and films as cell carriers. These keratin templates can be derived from keratinous wastes such as human hair and chicken feathers, which currently do not have significant commercial value and contribute to environmental pollution through disposal via incineration or landfills. Our technology involves the extraction of keratins from the organic waste streams mentioned, and fabricating various forms using solubilized keratins as the raw material. These materials have been shown to be cell compatible and evoke minimal host tissue response in animal studies. The templates we have developed represent a new class of alternative biomaterials which are functional and sustainable.

TECHNOLOGY FEATURES & SPECIFICATIONS

Keratin templates, derived from hair and feathers, exhibit a remarkable capability to tailor their mechanical properties, making them highly adaptable for various biomedical applications. These templates serve as promising scaffolds due to their tunable nature, allowing for the creation of structures with desired mechanical characteristics, crucial for supporting tissue regeneration and repair.

In vitro studies have demonstrated the efficacy of these keratin templates by revealing robust cell proliferation and metabolic activity. Such findings underscore their compatibility with biological systems, indicating their potential for promoting tissue growth and regeneration.

Furthermore, in vivo studies have provided encouraging results, showing no signs of acute inflammation and minimal host tissue response upon implantation. This suggests the biocompatibility of keratin templates, which is essential for their successful integration into living organisms.

Moreover, the biodegradability of keratin templates enhances their appeal for biomedical applications, ensuring that they degrade naturally over time without causing harm or leaving behind residue.

Overall, the versatility, biocompatibility, and biodegradability of keratin templates derived from hair and feathers make them promising candidates for a wide range of biomedical applications, offering hope for advancements in tissue engineering and regenerative medicine.

POTENTIAL APPLICATIONS

- Sponges as tissue fillers : These sponges are flexible, stable and degrade slowly through enzymatic digestion, hence making them suitable for use as tissue fillers.
- Gels for wound healing: These gels are stable and have a gradient structure which mimics the native skin structure. Antimicrobial elements can be incorporated, enhancing their suitability for wound healing applications.
- Fibers as sutures: These fibers are flexible, stable and degradable over time in vivo, hence making them an alternative absorbable suture that is made from renewable and sustainable raw materials.
- Films as cell carriers: These films are cell compatible and can be surface functionalized to enhance cell response.

UNIQUE VALUE PROPOSITION

These materials provide a significant waste valorisation potential, and have been shown to be cell compatible and evoke minimal host tissue response in animal studies. They have excellent biological properties of keratins which makes it suitable for several biomedical applications. The technology provider is able to produce a variety of keratin templates which can be produced for various application.