Technology from Kyoto University

Method for Preparing Easy-to-Handle Protein Sheets such as Keratin and Collagen

We are looking to out-license the technology for its commercialization.

Enables detachment-free protein sheet fabrication for cell sheet engineering and scaffold development.

◆Background

Protein sheets such as collagen and keratin have diverse applications in wound care, regenerative medicine, and cosmetics. Conventional fabrication methods, however, often suffer from complex processing, insufficient mechanical strength and flexibility, and structural non-uniformity.

◆Description

Researchers at Kyoto University have developed a simple method for fabricating protein sheets by density gradient centrifugation, eliminating the need for complex processes such as solution casting (Fig. 1).The resulting sheets are mechanically robust enough to be handled with tweezers while retaining their shape. SEM analysis also revealed a porous structure (Fig. 2), which may enhance compatibility with cells and other materials. The sheets have potential applications as scaffolds for cell sheet engineering (Fig. 3), as well as collagen or keratin sheets for burn care, regenerative medicine, and aesthetic applications.

- **Simple fabrication of protein sheets**
  Protein sheets can be fabricated without heating or drying and are readily recovered.
- **Tunable sheet properties through crosslinking**
  Sheet properties can be tuned simply by adding or omitting a crosslinking agent: crosslinking enhances elasticity and strength, while non-crosslinked sheets offer greater flexibility.
- **Compatibility with various cell types**
  The protein sheets can be combined with various cell types and used as scaffolds for cell sheet fabrication (Fig.3).

◆Development Status

- Lab-scale sheet fabrication method established
- Successful fabrication demonstrated with keratin and collagen
- Cell culture compatibility demonstrated with the sheets as substrates

◆Applications

- Regenerative medicine
- Research tools
- Sheet fabrication device

◆Offer

- Patent License
- Option for License

◆Contact

TLO-KYOTO Co., Ltd.

Mail: licensing_ku@tlo-kyoto.co.jp
Phone: +81-75-753-9150

Level 3, International Science Innovation Bldg., Kyoto Univ., Yoshidahonmachi, Sakyo-ku, Kyoto 606-8501, Japan

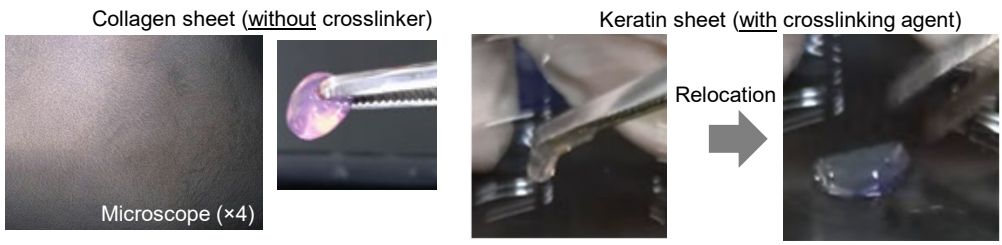

Fig.1. Protein Sheets Prepared by the Proposed Method
Both the collagen and keratin sheets could be easily handled with tweezers.

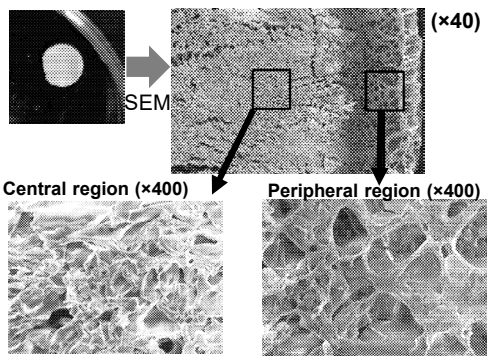

Fig.2. Freeze-dried keratin sheet (with crosslinker)
SEM analysis revealed a porous structure of the sheet.

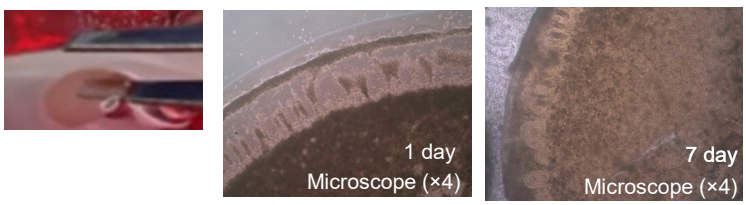

Fig. 3. Cells cultured on a keratin sheet (without crosslinker)
The sheet was easily lifted and handled with tweezers. After 7 days of culture, the sheet retained its morphology, indicating good structural stability. Cell proliferation was observed at the sheet edges, suggesting that the cells remained viable and proliferative.