

Bioabsorbable adhesive sheet can close wounds in tissues and organs

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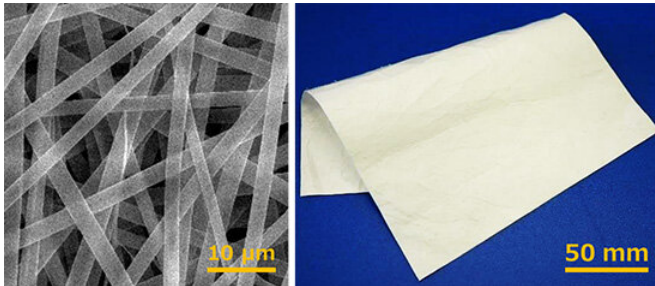


Figure. Surgical wound dressing sheet composed of Alaska pollock gelatin modified with decanyl groups. (left) Microstructure. (right) Large sheet.

NIMS has developed a surgical wound dressing sheet capable of closing wounds in wet biological tissues by simply being placed over a wound. This sheet also showed biodegradability during wound healing. In addition, this sheet demonstrated higher adhesion and biocompatibility compared to currently used surgical sealants while having the same level of wound healing efficacy. The use of this sheet may also reduce treatment costs.

Three types of medical sheets are currently available to seal surgical [wounds](#): poly (glycolic acid) sheet, fibrin sheet and cell sheets. Although these products have proven generally effective, they also have some issues: they have poor adhesion to biological tissues under the condition in which these tissues are exposed to blood and other [bodily fluids](#) during surgery, they are inadequately biocompatible and may trigger foreign body reactions and cell sheet is expensive. Development of new surgical wound dressing sheets that can resolve these issues had been awaited.

This research group chemically modified Alaska pollock gelatin with decanyl groups (10-carbon alkyl groups) to enhance its ability to penetrate the

surface of biological tissues. The group then processed this gelatin into a sheet using an electrospinning technique. When this sheet was placed over a wound created in extracted rat lungs it firmly adhered to the lung surface. The sheet remained intact on the lung surface when the lung was inflated by the level of air pressure that could be induced by the human cough. The sheet was also observed to degrade and be absorbed within 21 days when implanted in rat subcutaneous [tissue](#).

This bioabsorbable sheet can facilitate wound closure in tissues and organs by simply being placed over a wound. By contrast, existing gelatinous and granular adhesives require specialized devices, such as a sprayer, for their application. This versatile, easy-to-use sheet may potentially have a wide range of surgical and internal medicine applicability. Alaska pollock skin is the source of the gelatin used to produce this sheet. It is available as a waste product of kamaboko (a processed seafood product in Japan) processing factories and is economically obtainable, potentially lowering the cost of treating surgical wounds. We plan to develop this material into a commercial medical device through [collaborative research](#) with the medical and industrial sectors.

This project was carried out by a research team led by Tetsushi Taguchi (Group Leader, Research Center for Functional Materials, NIMS). This research was published in *Biomaterials Science*, an online journal, on November 25, 2020, GMT.

More information: Hiroaki Ichimaru et al. Prevention of pulmonary air leaks using a biodegradable tissue-adhesive fiber sheet based on Alaska pollock gelatin modified with decanyl groups, *Biomaterials Science* (2020). [DOI: 10.1039/d0bm01302a](https://doi.org/10.1039/d0bm01302a)

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