

Radiation Processing of Hydrogel Sheet Dressings for Skin Care Products

Skin provides a physical barrier that protects the body from outside environment. Loss of skin tissue from injuries such as burn that covers a large surface area of the body can be fatal to patients as they are susceptible to dehydration and infection. Wound dressings are often used by doctors to provide a temporary coverage over a wounded skin to promote the regeneration of new skin tissue underneath. Up to date commercial, modern wound dressings are available in the form of alginates, foams, hydrocolloids, films, and hydrogels for wound treatment. However, most of these dressings have to be imported from abroad to treat patients in various Thai hospitals. Therefore, the ability to fabricate wound dressings and distribute their usage within the country can greatly reduce the hospital cost burden and increase access to patients.

Compared to other types of wound dressings, hydrogel sheets are unique as they possess dual properties to either donate moisture to the wound, or uptake additional fluid from the wound. To this end, hydrogel sheet dressings have been applied in the treatment of superficial wounds, wounds with eschar or slough, and deep chronic wounds. In this project, gamma radiation technology is applied to fabricate hydrogel sheet dressings from poly(vinyl alcohol) (PVA), a polymer that is extensively used in biomedical application based on its biocompatible property. During the radiation process, PVA molecules in the starting aqueous solution are linked together to form a stable 3 dimensional network, which later turns into a 2-3 mm thick sheet that entraps water inside the network space. As no other chemical reagents are required to link the polymer molecules together, the gamma radiation technology is considered a green processing technique and the resulting hydrogel sheets are free of chemicals that might be harmful to the body. In addition, radiation technique is also generally used to sterilize medical devices. Therefore, the final hydrogel sheet dressings are sterile without the use of preservatives.


With these hydrogel sheets serving as a base material, other active ingredients can be further built into the sheet system. For example, the addition of silver compounds can confer antibacterial properties to the hydrogel sheet dressings. Besides the application of hydrogel sheets for medical purpose, they can also be extended to cosmetics as a moisturizing pad such as eye pads or face masks.

Skin Care Product: Wound dressing

by TINT

TINTGEL

Directions: Open the package and remove product from tray.
Apply over wound with polyethylene sheet remained on the top surface.
เปิดซอง หยิบแผ่นไฮโดรเจลออกจากถาด วางด้านที่เป็นฉีกขาดติดลงบนแผล
อย่าให้แผ่นพลาสติกโผล่บนแผล




polyethylene sheet
hydrogel

นุ่มและแบบนิวมืด ให้ความชุ่มชื้น สดุดอกง่าย ครอบคลุมทุกวินาที
soft and conformal to skin, moisturizing, easy to remove, change daily

Ingredients: deionized water, poly(vinyl alcohol), no preservatives
ส่วนประกอบ: น้ำกรองบริสุทธิ์ชนิดไม่เบี้อแอลกอฮอล์ ไม่มีสารกันเสีย

สถานีนเทคโนโลยีนิวเคลียร์แห่งชาติ
(องค์การมหาชน) สำนักงานใหญ่
9/9 หมู่ที่ 7 ต.ทรายมูล อ.องครักษ์
จ.นครนายก 26120
<http://www.tint.or.th>
ผลิตในประเทศไทย Product of Thailand

MFG :
EXP :



BARCODE FOR REFERENCE ONLY

ห้ามจำหน่าย

TINTGEL

แผ่นไฮโดรเจลปิดแผล
Clear hydrogel sheet
8.5 x 8.5 cm



STERILE R

4-25°C

For low exudating wounds from minor thermal burn,
cuts or scrapes, friction blisters, facial laser resurfacing,
and moisturizing skin peels
สำหรับแผลเนื้ออ่อนบริเวณขึ้นผิวหน้าทำพริ้ว
แผลชาหรือยาเคมีหรือลอก แผลพุพอง แผลจากการทำเลเซอร์
และให้ความชุ่มชื้นแก่ผิวหนัง



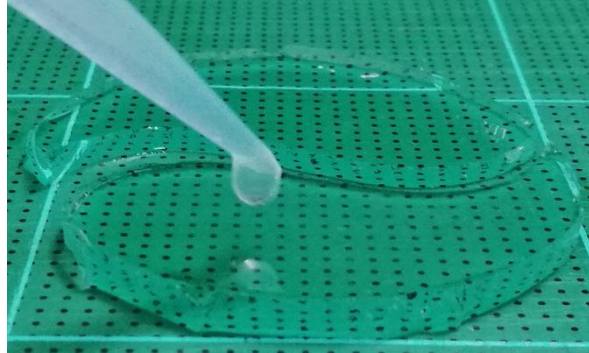
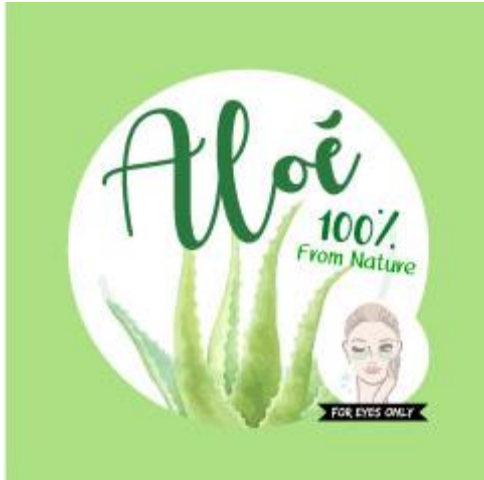
NO Preservatives
ไม่มีสารกันเสีย

ผลิตภัณฑ์ต้นแบบจากนักวิจัยไทย สถานีนเทคโนโลยีนิวเคลียร์แห่งชาติ (องค์การมหาชน)
Innovated by researchers at Thailand Institute of Nuclear Technology (Public Organization)

Hydrogel sheets are unique as they possess dual properties to either donate moisture to, or uptake additional fluid from the wound. Currently we can utilize both gamma and electron irradiation at TINT to process hydrogel sheet aimed for wound healing application. Preliminary tests showed that our hydrogels are not toxic to the cells (ISO 10993-5) and could heal surgical wounds in rat model (IACUC 25/01/2019, National Laboratory Animal Center, Mahidol University).

Skin Care Product: Eye mask

by TINT



In this project, gamma radiation technology is applied to fabricate hydrogel sheet dressings from poly(vinyl alcohol) (PVA), a polymer that is extensively used in biomedical application based on its biocompatible property. During the radiation process, PVA molecules in the starting aqueous solution are linked together to form a stable 3 dimensional network, which later turns into a sheet that entraps water inside the network space. With these hydrogel sheets serving as a base material, active ingredients such as natural extracts can be further built into the sheet system. Our current prototype uses natural Aloe vera gel to coat on the hydrogel sheet to be used as an eye mask. Preliminary tests showed that our hydrogels are not toxic to the cells (ISO 10993-5) and challenged irritation patch test in human subjects (CosNat 23/62-R) showed that the hydrogels could induce minimal irritation if used for long-term period (24 h)