
Bandage for Advanced Wound and Ulcer Healing

Technology #16020

Applications

Layer-by-layer (LbL) ultra-thin films can be generated from a wide variety of materials including biological and synthetic molecules. An LbL film composed in part of layers of short interfering RNA (siRNA) constructs can be applied to a variety of substrates, particularly bandages and other fabrics/fibers. The film can serve as a vehicle for gene silencing, releasing a steady dose of siRNA directly onto a target. Applications include chronic, non-healing wounds and treatment of inflammatory diseases (e.g., eczema; psoriasis).

Problem Addressed

RNA interference (RNAi), used to silence genes by destroying target mRNA sequences, is a promising potential therapeutic approach with a variety of applications. However, its use is currently limited in part due to concerns regarding delivery. Systemic administration of RNAi constructs (e.g., siRNA) can be toxic and the method does not guarantee lasting therapeutic activity at the site of interest. Localized administration of siRNA via LbL films is a biocompatible method to administer a tailored dose of sustained RNAi treatment with minimal side effects.

Technology

LbL films are generated by the sequential adsorption of complementary (e.g., charge-based) materials onto a surface. These binding interactions allow for a progression of layers that compose a nanometer-scale thin film. Both the substrate and layering materials for LbL assembly can include biological components such as a living tissue substrate and growth factors or DNA as layering materials. Accordingly, this technology is a bandage generated from thin films composed of multiple components, one of which is RNAi (e.g., siRNA constructs). The bandage allows for localized gene silencing and can be used for accelerated wound healing. Multiple siRNAs can be layered into the films, providing the means for complex treatment options. The films provide a sustained release of siRNA and can be tailored for a precise dose based on the number of layers assembled.

Advantages

- Biocompatible
- Custom LbL assembly allows for tailored RNAi dose
- Sustained release of siRNA over the course of 10 days
- Can deliver multiple siRNAs
- Ease of patient compliance—bandage requires minimal effort

Categories For This Invention:

Materials

Thin Films

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Medical Devices
Therapeutic (Medical Devices)
Life Sciences
Clinical Applications
Dermatology
Inflammatory Disease
Wound Healing
Therapeutics
Gene Silencing

Intellectual Property:

Compositions and methods for nucleic acid delivery
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Publications:

Nanolayered siRNA Dressing for Sustained Localized Knockdown
ACS Nano
May 14, 2013
Bandages Silence Genes
Chemical and Engineering News
May 23, 2013

External Links:

The Hammond Lab
<https://hammondlab.mit.edu/>

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