detachment and also removes molecules that can inhibit wound healing. These apertures also allow oxygen to enter the wound to promote wound healing. These apertures also allow excess exudate to drain preventing tension that can lead to dislodgement of these materials from the wound area or skin. Furthermore, the apertures allow space for the skin to grow and thus cover the wound with healthy tissue.

[0015] Wound vacuum assisted closure (VAC) devices typically need to be attached to the skin and adhesive materials suffer from the limitations in these devices as in wound dressings. Additionally, a non-adhesive material typically must be placed between the sponge and the VAC to prevent disruption of the graft when removing the dressing. As an alternative, microstructures could be used to attach the dressing eliminating the need for the non-adhesive material.

[0016] The spring characteristics of the microstructure arrays provide important features to improve the effectiveness of the technology. The wound and surrounding tissue move with skin motion. In addition, wounds are subject to edema, which results in swelling of the tissue. This can result in shear between the wound, underlying tissues and patient skin and the wound dressings, skin substitutes, and skin grafts. Shear can lead to tissue damage, inflammation, and infection, incomplete engraftment of skin grafts, and the suboptimal interaction of skin substitutes with the wound. The springs in the microstructure arrays enable the device to stretch, expand, and contract, and thus reduce shear and enable more consistent and uniform contact between the wound and underlying tissue and the wound dressings, skin substitutes, and skin grafts. This reduces irritation, inflammation, scarring, and infection. In addition, the springs also reduce the risk of the wound dressing, skin substitute, or skin graft detaching from the skin, wound, or underlying tissue.

EXAMPLES

[0017] The present disclosure provides devices and methods for securely covering a wound by attaching a wound dressing, skin substitute, and/or skin grafts to the skin, wound or underlying tissue.

[0017a] In an aspect, the present disclosure provides a wound cover device comprising: a backing comprising a wound-side surface and an exterior-side

surface; one or more micro-staple arrays attached to the wound-side surface, wherein the one or more micro-staple arrays comprise a base wire extending in a repeating undulating pattern and a plurality of staples extending from repeating positions along the base wire; and a wound treatment layer attached to the one or more micro-staple arrays, wherein the base wire can include an outer perimeter larger than an outer perimeter of the wound treatment layer, and wherein the one or more micro-staple arrays comprises a matrix of evenly distributed staples that uniformly distributes staples across an interior of the wound treatment layer.

[0017b] In another aspect, the present disclosure provides a wound treatment device comprising: a backing including a wound-side surface and an exterior-side surface; a matrix of evenly distributed micro-staples attached to the wound-side surface; a base wire extending in a repeating undulating pattern with the matrix of evenly distributed micro-staples extending from repeating positions along the base wire; and a wound treatment layer including the micro-staples uniformly distributed across an interior of the wound treatment layer, wherein the base wire can include an outer perimeter larger than an outer perimeter of the wound treatment layer.

[0017c] In a further aspect, the present disclosure provides a device comprising: a backing including a wound-side surface and an exterior-side surface; a base wire extending in a repeating undulating pattern with a matrix of evenly distributed micro-staples extending from the base wire in repeating positions; and a wound treatment layer including the micro-staples uniformly distributed across an interior of the wound treatment layer, wherein the base wire can include an outer perimeter larger than an outer perimeter of the wound treatment layer.

[0018] In some examples, the present disclosure provides a microstructure wound cover comprising one or more microstructures for attaching the cover to a

CLAIMS:

1. A wound cover device comprising:

a backing comprising a wound-side surface and an exterior-side surface;

one or more micro-staple arrays attached to the wound-side surface, wherein the one or more micro-staple arrays comprise a base wire extending in a repeating undulating pattern and a plurality of staples extending from repeating positions along the base wire; and

a wound treatment layer attached to the one or more micro-staple arrays, wherein the base wire can include an outer perimeter larger than an outer perimeter of the wound treatment layer, and

wherein the one or more micro-staple arrays comprises a matrix of evenly distributed staples that uniformly distributes staples across an interior of the wound treatment layer.

2. The wound cover device of claim 1, wherein the wound treatment layer comprises a skin replacement layer comprising natural skin, synthetic skin or a combination thereof.

3. The wound cover device of claim 2, wherein the wound treatment layer comprises a skin replacement layer comprising a xenograft, an allograft, an autograft or a combination thereof.

4. The wound cover device of claim 1, wherein the backing comprises a stretchable material.

5. The wound cover device of claim 2, wherein the backing comprises polyurethane, polyethylene or polyethylene terephthalate.

6. The wound cover device of claim 1, wherein the backing includes a perforation.

7. The wound cover device of claim 6, wherein the perforation comprises an array of holes extending through the backing from the wound-side surface to the exterior-side surface.

8. The wound cover device of claim 7, wherein the wound treatment layer is located within an outer perimeter of the array of holes.

9. The wound cover device of claim 7, wherein the array of holes is surrounded by an unbroken border of material of the backing.

10. The wound cover device of claim 1, wherein the one or more micro-staple arrays is attached to the backing with an adhesive layer.

11. The wound cover device of claim 10, wherein the adhesive layer is perforated.

12. The wound cover device of claim 10, wherein the adhesive layer comprises acrylate or other known medical adhesive materials.

13. The wound cover device of claim 10, wherein the adhesive layer completely covers the wound-facing side.

14. The wound cover device of claim 1, wherein the one or more micro-staple arrays is stretchable.

15. The wound cover device of claim 14, wherein the one or more micro-staple arrays is stretchable in orthogonal directions.

16. The wound cover device of claim 14, wherein the one or more micro-staple arrays comprises a spring structure.

17. The wound cover device of claim ~~16~~1, wherein the ~~one or more micro-staple array comprises:~~

~~a~~ base wire extending in the repeating~~an~~ undulating pattern forms a repeating square-wave pattern~~; and~~

~~a plurality of staples extending from the base wire~~.

~~18. The wound cover device of claim 1, wherein an outer perimeter of the one or more micro-staple arrays is larger than an outer perimeter of the wound treatment layer.~~

~~19~~18. The wound cover device of claim ~~18~~1, wherein the one or more micro-staple arrays extends across an interior of the wound treatment layer from a first edge to a second opposite edge.

~~20. The wound cover device of claim 18, wherein the one or more micro-staple arrays comprises a matrix of evenly distributed staples that uniformly distributes staples across an interior of the wound treatment layer.~~

~~21~~19. The wound cover device of claim 1, wherein the one or more micro-staple arrays includes a plurality of staples projecting through the wound treatment layer and configured to engage the skin and anchor the wound cover device thereto.

~~22~~20. The wound cover device of claim ~~21~~19, wherein each of the plurality of staples has a length of at least 1 mm.

~~23~~21. The wound cover device of claim ~~22~~20, wherein each of the plurality of staples has a length less than or equal to 10 mm.

~~24~~22. The wound cover device of claim ~~21~~19, wherein at least some of the plurality of staples are angled relative to the backing at an angle in the range of ninety to forty-five degrees.

~~25~~23. The wound cover device of claim 1, further comprising an edge micro-staple array disposed along and extending partially beyond an edge of the backing separate from the one or more micro-staple arrays.

~~26~~24. The wound cover device of claim 1, wherein the wound treatment layer comprises a wound dressing layer.

~~27~~25. The wound cover device of claim ~~26~~24, wherein the wound dressing layer comprises a bandage, gauze, a cotton layer or a lint layer.

~~28~~26. The wound cover device of claim ~~26~~24, wherein the wound dressing layer comprises a hydrocolloid or a hydrogel.

27. A wound treatment device comprising:

a backing including a wound-side surface and an exterior-side surface;

a matrix of evenly distributed micro-staples attached to the wound-side surface;

a base wire extending in a repeating undulating pattern with the matrix of evenly distributed micro-staples extending from repeating positions along the base wire; and

a wound treatment layer including the micro-staples uniformly distributed across an interior of the wound treatment layer,

wherein the base wire can include an outer perimeter larger than an outer perimeter of the wound treatment layer.

28. A device comprising:

a backing including a wound-side surface and an exterior-side surface;

a base wire extending in a repeating undulating pattern with a matrix of evenly distributed micro-staples extending from the base wire in repeating positions; and

a wound treatment layer including the micro-staples uniformly distributed across an interior of the wound treatment layer,

wherein the base wire can include an outer perimeter larger than an outer perimeter of the wound treatment layer.