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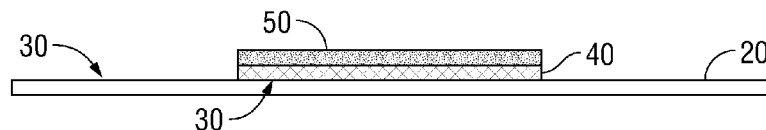


FIG. 2

(57) Abstract: The present disclosure relates to dressings, such as adhesive bandage, which can have an absorbent pad, and non-stick film secured thereto which has at least two different polymeric materials, a first polymeric material and a second polymeric material having a lower melting point than the first polymeric material.



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DRESSINGS AND RELATED METHODS THEREFOR

5

BACKGROUND

Technical Field

The present disclosure generally relates to dressings, and more particularly, relates to wound dressings and adhesive bandages that include a non-sticking film having a plurality of polymeric materials having differing melting points or melting ranges including, for example, a first polymeric material with a first melting point or melting range and a second polymeric material with a second melting point or melting range that is lower than the first melting point or melting range.

Description of Related Art

15 Karami et al., in U.S. Patent No. 5,167,613, disclosed a composite vented wound dressing with a primary dressing placement on the skin to cover a wound and an overlaying secondary dressing containing an absorbent pad for receiving and retaining wound fluids diffusing thereto from the wound.

Patel, in U.S. Patent No. 5,465,735, disclosed a wound dressing with an absorbent
20 pad for receiving and retaining wound fluids sandwiched between first and second outer sheet materials. The first sheet material for placement on the wound can be a perforated non-adherent film for preventing the dressing from sticking to the wound. The second sheet material can be characterized as being bacteria-impermeable.

Patel, in U.S. Patent No. 5,632,731, disclosed a non-adherent wound dressing with a multilayer absorbent pad comprising an inner layer of a low density absorbent material for receiving fluids diffusing from the wound and an overlying layer of a high density absorbent material for receiving and retaining wound fluids diffusing through the
5 inner layer.

SUMMARY

One or more aspects of the invention can be directed to a dressing for applying on a wound. In accordance with one or more embodiments of such aspects of the invention,
10 the dressing can comprise an absorbent pad having a wound-facing surface and a second surface opposite from the wound-facing surface, and a non-stick film secured to the absorbent pad on the wound-facing surface, the non-stick film having a first region comprising a first polymeric material and a second region comprising a second polymeric material having a lower melting point than the first polymeric material. The first
15 polymeric material can comprise, consist essentially of, or consist of a first thermoplastic polymer selected from the group consisting of polypropylene, polyvinylidene fluoride, polytetrafluoroethylene, polyvinylchloride, polyamide, polyethylene, polyvinyl alcohol, polyester, polystyrene, polymethylpentene, polyoxymethylene, and mixtures thereof; the second polymeric material can comprise, consist essentially of, or consist of a second
20 thermoplastic polymer selected from the group consisting of polypropylene, polyvinylidene fluoride, polytetrafluoroethylene, polyvinylchloride, polyamide, polyethylene, polyvinyl alcohol, polyester, polystyrene, polymethylpentene, polyoxymethylene, and mixtures thereof; and the second region can define a securing

layer attaching, or is attachable to, the non-stick film to the wound-facing surface of the absorbent pad. The dressing can further comprise a second film secured to the absorbent pad on the second surface thereof. The second film can have a third region comprising the first polymeric material and a fourth region comprising the second polymeric material. In accordance with further variants of such embodiments, the fourth region can define a second securing layer attaching, or is attachable to, the second film to the second surface of the absorbent pad. The first polymeric material can consist or consist essentially of a first polyester and the second polymeric material can consist or consists essentially of a second polyester. The second polymeric material can comprise an amorphous polymer having a melting temperature range in a range of from about 120°C to about 200°C. The first polymeric material can comprise or consist essentially of polyethylene terephthalate with a melting temperature range in a range of from about 200°C to about 275°C. The second polymeric material can comprises or consist essentially of polyethylene terephthalate with a glass transition temperature in a range of from about 60°C to about 88°C. The dressing can further comprise a backing substrate having an adhesive material on a surface thereof. In accordance with a variant of such one or more embodiments, the backing substrate can be secured to the absorbent pad at the second surface. The backing substrate can comprise or consist essentially of a woven fabric and the adhesive material can comprise or consist essentially of an acrylic. The non-stick film can have one or more perforated regions, each of which can have a plurality of perforations extending through the thickness of the film. The absorbent pad can comprise a fiber selected from the group consisting of cellulosic fibers such as viscose, cotton, fiberized paper pulp, and lyocell, and polymeric fibers such as

polypropylene, and polyester fibers, as well as combinations thereof. The absorbent pad can have a first, absorbent layer comprising, consisting essentially, or consisting of a low density absorbent fabric and a second, wicking layer comprising, consisting essentially of, or consisting of a high density absorbent fabric. The dressing can further comprise at least one therapeutic agent in any of the absorbent pad and the non-stick film. In one or more variants of any one or more embodiments of the invention, the absorbent pad can comprise polyhexamethylene biguanide (PHMB).

One or more aspects of the invention can be directed to a method of producing a dressing. The method of producing the dressing can comprise providing a non-stick film having a first region comprising a first polymeric material and a second region comprising a second polymeric material with a lower melting point than the first polymeric material, and securing the non-stick film to an absorbent pad at a wound-facing surface thereof. Securing the non-stick film to the absorbent pad can comprise enclosing the absorbent pad within an envelope comprising the non-stick film. Securing the non-stick film to the absorbent pad can comprise melting at least a portion of the second polymeric material. Securing the non-stick film to the absorbent pad can comprise exposing the non-stick film to an environment with a temperature in a range of from about 140°C to about 200°C. The method of producing the dressing can further comprise attaching the absorbent pad to a backing substrate having an adhesive material on a surface thereof. The first polymeric material can have a melting range in a range of from about 200°C to about 275°C, and, in accordance with further embodiments of the invention, the second polymeric material can have a melting range in a range of from about 120°C to about 200°C. The first polymeric material can comprise, consist

essentially of, or consist of a first thermoplastic polymer selected from the group consisting of polypropylene, polyvinylidene fluoride, polytetrafluoroethylene, polyvinylchloride, polyamide, polyethylene, polyvinyl alcohol, polyester, polystyrene, polymethylpentene, polyoxymethylene, and mixtures thereof. The second polymeric

5 material can comprise, consist essentially of, or consist of a second thermoplastic polymer selected from the group consisting of polyamide, polyethylene, polyvinyl alcohol, polyester, polystyrene, polymethylpentene, polyoxymethylene, and mixtures thereof. The first polymeric material can consist essentially of a first polyester having a melting range in a range of from about 200°C to about 275°C and the second polymeric

10 material can consist essentially of a second polyester having a melting range in a range of from about 120°C to about 200°C. The absorbent pad can have a first, absorbent layer comprising or consisting essentially of a low density absorbent fabric and a second, wicking layer comprising or consisting of a high density absorbent fabric. Securing the non-stick film to the absorbent pad can comprise securing the second region of the non-

15 stick film to the second wicking layer of the absorbent pad. The method can further comprise introducing at least one therapeutic agent in any of the absorbent pad and the non-stick film. Introducing the at least one therapeutic agent can comprise immersing at least a portion of the absorbent pad in a fluid comprising polyhexamethylene biguanide to produce a PHMB-immersed pad; and drying the PHMB-immersed pad to produce a

20 PHMB-containing pad. In one or more embodiments of the invention, securing the non-stick film to the absorbent pad can comprise securing the second region of the non-stick film to the PHMB-containing pad.

BRIEF DESCRIPTION OF THE DRAWINGS

The present disclosure will be more clearly understood from the following description in connection with the accompanying drawings in which:

FIG. 1 is a plan view of an adhesive bandage, in accordance with at least one
5 embodiment described herein;

FIG. 2 is an elevational view of the adhesive bandage shown in FIG. 1;

FIG. 3 is a plan view of a dressing, in accordance with at least one embodiment described herein;

FIG. 4 is an elevational view of the dressing, shown in FIG. 3, and further
10 showing an absorbent pad between a non-stick films and a second film;

FIG. 5 is a plan view of an adhesive bandage, in accordance with at least one embodiment described herein; and

FIG. 6 is an elevational view of the adhesive bandage shown in FIG. 5.

15 DETAILED DESCRIPTION

One or more aspects of the invention can be directed to dressings and bandages that are typically applied to any of cuts, abrasions, and wounds to collect blood and other wound exudates. One or more aspects of the invention can be directed to improving the adherence of a non-stick film or adherent resistant layer on an absorbent pad of dressings
20 and bandages. One or more further aspects of the invention can be directed to increasing absorbance capacity for blood, wound exudates, or other fluids of dressings and bandages while reducing the likelihood of separation or delamination of the non-stick film from the absorbent pad. One or more still further aspects of the invention can be directed to

providing a non-stick film, at a wound side of dressings and bandages, and an adherent surface or layer at the non-wound facing side of dressings and bandages. One or more yet further aspects of the invention can be directed to facilitating bonding a non-stick film to an absorbent pad of dressings and bandages, which can allow the dressing or bandage
5 to withstand greater stresses associated with a bleeding and/or oozing wound.

In accordance with one or more embodiments of the invention, a dressing can comprise at least one absorbent pad having a bottom, or a first surface, attached to a backing material or substrate and a top, typically a surface nearest a wound, or facing a wound, and a non-stick film having non-wound facing side positioned next to the top, or
10 secured to the first surface, of the absorbent pad, as well as a wound-facing side, intended to be against or facing the wound. The non-stick film can comprise a first region comprising, consisting essentially of, or consisting of a first polymeric material and a second region comprising, consisting essentially of, or consisting of a second polymeric material. The first and second polymeric materials may be combined in a multilayer
15 configuration such that the first and second polymeric materials may be combined to form a single or unitary film. In some embodiments of the invention, the non-stick film can comprise a first region having a higher amount of the second polymeric material relative to an amount of the first polymeric material, and a second region with a higher amount of the first polymeric material relative to an amount of the second polymeric
20 material, thereby defining a gradient of polymeric material across or through at least a portion of the non-stick film. In accordance with some embodiments of the invention, the first and second polymeric materials may include or be based on the same type of polymer, but have different melting points, melting ranges, softening points, or softening

ranges. In accordance with some embodiments of the invention, the first and second polymeric materials may comprise, consist essentially of, or consist of polyesters, but have differing melting points melting ranges, softening points, or softening ranges. In accordance with some particular embodiments of the invention, the second polymeric material can have a lower melting point than the melting point of the second polymeric material. In accordance with some particular embodiments of the invention, the second polymeric material can have a lower melting point or melting temperature range that is lower than the melting point or melting temperature range of the first polymer. In accordance with some embodiments of the invention, the first polymeric material can have a melting temperature range and the second polymeric material can have melting temperature range that has an initial melting temperature that is at a temperature that is less than the melting temperature range of the first polymeric material.

In accordance with some embodiments of the invention, the adhesive bandage can comprise a backing material or substrate, an adhesive applied to the backing material or substrate, an absorbent pad having a bottom attached to the backing material or substrate and a top nearest a wound, and, a non-stick film with a non-wound facing surface positioned next or secured to the top, or a first surface of the absorbent pad, and a wound-facing surface intended to face the wound during use. The non-stick film can comprise a first polyester having a first melting point, or a first melting temperature range, and can further comprise a second polyester having a second melting point, or a first melting temperature range, such that the first melting point or range is greater than the second melting point or range. In other cases, at least a portion of the first melting temperature range is greater than at least a portion of the second melting temperature range.

In any of the various embodiments disclosed herein, the non-stick film can have a thickness in a range of from about 10 microns to about 50 microns. Typically, the non-stick film has a uniform thickness profile.

At least a portion of the non-stick film can have a perforated region having a plurality perforations or apertures through the thickness of the film. When utilized, the second film can have a perforated region with a plurality of perforations or apertures. The perforations can be uniformly distributed through the at least a portion of the non-stick film. In a variant of such embodiments, the density of the perforations can be varied. Typically, the perforated region has a perforation density in a range of from about 300 perforations per square inch to about 400 perforations per square inch. Each of the plurality of perforations can have any geometrical shape but each typically has circular profile. The size of any of the perforations can vary and can be in a range of from about 0.01 mm to 1 mm; typically, the perforations have a nominal diameter in a range of from about 0.5 mm to about 1 mm.

The non-stick film typically includes at least a first polymeric material and a second polymeric material wherein the first and the second polymeric materials have different melting points. The non-stick film may be comprised of any suitable polymeric material capable of not adhering to the wound or wound exudates. In some particularly useful embodiments, the non-stick film may include a first layer comprising a first polymeric material and a second polymeric material having melting point or melting range that is lower than the melting point or melting range of the first polymeric material. In some variants of some embodiments of the invention, the second polymeric material has a melting point or a melting range in a range of from about 120°C to about 200°C. In

some further variants of some embodiments of the invention, the second polymeric material has a melting point or melting range in a range of from about 200°C to about 275°F. Some non-limiting examples include polyesters, such as polytetrafluoroethylene and polyethylene terephthalate, polyolefins, based on polyethylene, polypropylene, 4-methylpentene-1, and combinations thereof. In some embodiments of the invention, the first polymeric material comprises a polyethylene terephthalate, such as an amorphous polyethylene terephthalate having a melting point less than about 200°C and the second polymeric material comprises crystalline or at least partially crystalline polyethylene terephthalate having a higher melting point or melting range higher than that of the first polymeric material. In particularly useful embodiments of the invention, the non-stick film may include a first layer comprising a polyethylene terephthalate having a melting point of less than or equal to about 200°C, and a second layer comprising a polyethylene terephthalate having a melting point in a range of from about 200°C to about 275°C.

In accordance with further aspects of the invention, the first region of the non-stick film can have a glass transition temperature that differs from the glass transition temperature of the second region of the non-stick film. For example, the non-stick film can have a region comprising, consisting essentially of, or consisting of a polymeric material with a glass transition temperature in a range of from about 60°C to about 88°C, and, in some cases, can further have another region comprising, consisting essentially of, or consisting of another polymeric material with another, higher glass transition temperature. In some particular embodiments of the invention, the non-stick film can comprise, consist essentially of, or consist of an at least partially crystalline polymeric material, and an at least partially amorphous polymeric material. For example, the first

region can comprise, consist essentially of, or consist of an at least partially crystalline polymeric material; and the second region can comprise, consist essentially of, or consist of an at least partially amorphous polymeric material. In some configurations or variants thereof, non-stick film can have a decreasing crystallinity gradient from, for example, the
5 first region to the second region. In some further configurations or variants thereof, non-stick film can have an increasing gradient of an amount or level of amorphous polymer from, for example, the second region to the first region.

In some particular embodiments of the dressings or bandages, the thickness of the amorphous layer can be at least about 25 microns, and can be in a range of from about
10 25 microns to about 100 microns.

In embodiments wherein the same polymeric material is used to form the non-stick films described herein, the melting point may be altered or tailored by utilizing polymeric materials with differing molecular weights. In embodiments, the difference in melting points between the first and second polymeric materials used to form the non-
15 stick film may range from about 1 to about 100 degrees Celsius, from about 5 to about 50 degrees Celsius, in still other embodiments, from about 10 to about 25 degrees Celsius.

The non-stick film may be a multilayer film including at least two layers, wherein a layer, typically the layer closest to the absorbent pad, is made from a polymeric material having a lower melting point than another polymeric material in another layer
20 that is closest to the wound. It is envisioned that the multilayer film may be exposed to heat suitable at a temperature that softens and/or melts at least a portion of the film thereby facilitating adherence of the non-stick film to the absorbent pad, while maintaining the non-stick film ability to not adhere to the wound during use. For

example, the non-stick film can have a first layer comprised of, consist essentially of, or consist of an amorphous polyester having a melting point, melting temperature range, or softening point of at least about 200°C, in some cases, at least about 225°C, and, in some advantageous configurations, can have a melting temperature range in a range of from
5 about 200°C to about 275°C. The second layer can comprise, consist essentially of, consist of a polyester having a melting point, melting temperature range, or softening point of less than about 225°C, in some cases, less than about 200°C, and, in some advantageous configurations, can have a melting temperature range in a range of from about 120°C to about 200°C.

10 During production, any of the one or more non-stick films may thus adhered to any of the one or more absorbent pads by raising the temperature of at least a portion of the non-stick film to melting temperature conditions or environments, such as a temperature in a range of from about 140°C to about 200°C to at least partially melt or soften at least a portion of the second layer; followed by cooling to about room
15 temperature to effect adherence of the non-stick film to the absorbent pad. Unlike adhesives, the first polymeric layer will remain after being combined with the absorbent pad. In accordance with some embodiments of the invention, the non-stick film, the absorbent pad, or both may be heated to effect at least melting or softening of at least a portion of the second polymeric material. In some embodiments, the absorbent pad and
20 non-stick film may be heated ultrasonically. For example, lamination of any of the one or more film, or any portion thereof, on any of the one or more absorbent pads, or a portion thereof, can be effected by utilizing ultrasonic energy at frequency that sufficiently promotes thermal bonding by melting or softening of at least a portion of the

polymeric material. The ultrasonic frequency can be at least about 20 kHz, such as in a range of from about 20 kHz to 100 kHz, and is typically at about 20 kHz or at about 70 kHz. In accordance with some embodiments of the invention, the absorbent pad and non-stick film may be heated by using gamma radiation. The peel strength between the
5 at least a portion of the one or more non-stick films and the one or more absorbent pads, for 1 inch wide samples, can be in a range of from about 100 g/inch to about 1,000 g/inch as determined by peeling apart the film from the pad at a separation rate of about 12 inches per minute, at 25°C and 65% humidity.

The dressings and bandages described herein may further include a second film,
10 such as one positioned between the backing substrate and the absorbent pad. In such embodiments, the first non-stick film can be affixed to a bottom side of the absorbent pad and the second film can be affixed to the backing substrate by, for example, utilizing an adhesive. In such embodiments, the additional film can increase the ability of the dressing or bandage to store more wound exudates without increasing the likelihood of
15 the dressing or bandage to adhere to the wound. Any of the second film or additional film can be secured to the absorbent pad or any other component or substrate of the dressing or bandage by utilizing the same technique that would be utilized to secure the one or more non-stick films.

In accordance with some embodiments of the invention, any of the films may
20 further comprise fibers and/or additional reinforcement components. Some non-limiting examples of techniques that may be utilized to fabricate the various films include extruding, spraying, casting, and molding.

The backing material or substrate may be made from any suitable material for covering wounds. Non-limiting examples of the backing substrate include polymeric films, paper substrates, woven fabrics, and non-woven fabrics. Examples of polymeric films as well as techniques for making such films that can be used as backing substrates are disclosed in, for example, U.S. Patent No. 6,326,081 B1, the entire disclosure of which is hereby incorporated by reference. In accordance with some embodiments of the invention, the backing substrate may be made from at least one thermoplastic polymer. In accordance with some embodiments of the invention, the backing substrate may be made from at least one thermosetting polymer. Suitable thermoplastic polymers may include, but are not limited to, polyolefins, such as low density polyethylene and linear low density polyethylene, polyvinyl alcohol, nylon, polyester, polystyrene, polymethylpentene, polyoxymethylene, and combinations or mixtures thereof. In one or more embodiments of the invention, the backing substrate may include an elastic polymer. Suitable elastic polymers include, but are not limited to, metallocene catalyzed copolymers of ethylene with a co-monomer selected from the group consisting of octene, hexene, and butene; polymers from ethylene propylene diene monomer; styrene polymers, such as, but not limited to, styrene-butadiene-styrene and styrene-ethylene-butylene-styrene copolymers; ethylene methyl acrylate copolymers; ethylene vinyl acetate polymers, and mixtures thereof. A mixture of any of thermoplastic, thermosetting, and elastic polymers may also be used.

The backing substrate described herein may be formed using any suitable method. For example, the backing substrate may be extruded, molded, solvent cast, woven, or

braided. In other configurations, the backing layer or substrate can be a non-woven component.

In some embodiments of the invention, the backing substrate, or at least a portion thereof, may be perforated or have perforations to provide, for example, fluid
5 permeability therethrough, for example, from one surface to an opposite surface. In some embodiments of the invention, the backing substrate may have one or more embossed side. For example, one side or surface of the backing substrate may be smooth and the other side or surface has a matte finish.

One or more absorbent pads may be utilized in one or more embodiments
10 disclosed herein. The one or more absorbent pads may protect the wound from contamination by dirt and may collect blood, wound exudates, and other fluids. Any one or more of the absorbent pads may be made from natural materials, synthetic materials, or combinations thereof including, for example, natural fibers, such as, but not limited to, cotton and wood pulp fibers, and synthetic fibers, such as, but not limited to, polyester,
15 polyamide, and polyolefin fibers. In some particular configurations, the one or more absorbent pads can comprise, consist essentially of, or consist of cotton. In other particular embodiments of the invention, the one or more absorbent pad comprises, consists essentially of, or consists of rayon fibers. Synthetic fibers comprising two or more polymers may be used. Blends of various kinds or types of fibers may be used in
20 any one or more embodiments of the invention. For example, the one or more absorbent pads may be made from a blend of fibers including a first set of fibers made of viscose and a second set of fibers made from a polyester. Further, any of the fibers may be bi-component fibers. For example, any one or more of the fibers may have a core

comprised of one material, such as a first polymer, and a sheath, on at least a portion of the core, comprised of a second material, such as a second or different polymer. Any of the fibers can have any suitable denier for, for example, collecting a desired amount of fluid. For example, the linear mass density of any of the one or more fibers of the at least one absorbent pad can be in a range of from about 1 to 100 denier.

The one or more absorbent pads utilized in the various dressings and bandages can have a porosity that is suitable for allowing the pad to collect and retain fluids. It is envisioned that any portion of the pad may be porous. Any one or more of the absorbent pads may have uniform porosity, a random degree of porosity, or may have a porosity gradient, which, in some cases, may facilitate fluid management, such as fluid flow, in the absorbent pad. The pores may of any of the one or more absorbent pads may be created using any suitable method. For example, any of the one or more absorbent pads may include woven, non-woven fibers, or blends thereof, wherein the space between fibers creates the porosity. In accordance with further embodiments of the invention, any of the one or more absorbent pads may comprise a foam material. For example, any one of the materials described herein may be placed into a solution and lyophilized or freeze-dried to form a foam.

In accordance with some embodiments of the invention, any of the one or more absorbent pads can have a plurality characteristics or properties. For example, the absorbent pad can have at least two regions or portions, such as layers, with differing properties. Non-limiting examples of the various differing properties include density, porosity, diffusivity, and absorbency or absorptive capacity. In one or more embodiments of the invention, the absorbent pad can comprise, consist essentially of, or

consist of two or more regions, such as layers, of woven fibers. In one or more
embodiments of the invention, the absorbent pad can comprise, consist essentially of, or
consist of two or more regions, such as layers, of woven fabrics. In one or more
embodiments of the invention, the absorbent pad can comprise, consist essentially of, or
5 consist of two or more regions, such as layers, of non-woven fibers. In one or more
embodiments of the invention, the absorbent pad can comprise, consist essentially of, or
consist of a first region or layer of woven fibers and a second region or layer of non-
woven fibers. In one or more embodiments of the invention, the absorbent pad can
comprise, consist essentially of, or consist of a first region or layer with a low density
10 material, and a second region or layer of a high density material. In one or more
embodiments of the invention, the absorbent pad can comprise, consist essentially of, or
consist of a first, absorbent region or layer comprising a low density fabric, and a second,
wicking region or layer comprising a high density fabric. In one or more embodiments of
the invention, the absorbent pad can comprise, consist essentially of, or consist of an
15 absorbent region or layer of woven fibers, non-woven fibers, or both. In one or more
embodiments of the invention, the absorbent pad can comprise, consist essentially of, or
consist of wicking region or layer of woven fibers, non-woven fibers, or both. The
absorbent region or layer typically has a greater fluid absorptive capacity than the
wicking region or layer. The wicking region or layer typically has a higher fluid
20 diffusivity rate than the diffusivity rate of the absorbent region or layer.

In some cases, the absorbent pad can further comprise, or consist of a third region,
such as a layer, comprising, consisting essentially of, or consisting of any of woven
fibers, non-woven fibers, or combinations thereof. In some embodiments of the

invention, the third region or layer can have at least one characteristic that is similar to any one of the absorbent region or layer and the wicking region or layer. For example, the third region can have the same or about the same absorptive capacity as the absorbent region; or the third region can have the same or about the same fluid diffusivity as the wicking region. In some embodiments of the invention, the third region can have one or more characteristics that are between the characteristics of the first region and the second region. The third region can be proximate any of the first and second regions, and can be disposed between the first and second region. In some configurations, the third region can be disposed at a position that is distal from the first region, thereby disposing the second layer between the first and the third region. For example, the absorbent pad can comprise, consist essentially of, or consist of a first, absorbent region, a second, wicking region disposed against a first side or surface of the absorbent region, and a third, wicking region disposed against a second side or surface of the absorbent region, distal or opposite from the first side or surface.

The absorbent pad can be tailored to provide one or more aggregate properties or characteristics. For example, any of the relative amounts of each of the layers of the absorbent pad can be varied. In accordance with some embodiments of the invention, the ratio of the thickness of one layer to another layer of the absorbent pad can be in a range of from about 1:1 to about 7:1. For example, the ratio of the thickness or relative amount of the absorbent layer to the thickness or relative amount of the wicking layer can be in a range of from about 3:1 to about 5:1. In some particular embodiments of the invention, the ratio of the thickness or relative amount of the absorbent layer to the thickness or

relative amount of the wicking layer can be in a range of from about 2:1 to about 4:1, in some cases, in a range of from about 2.5:1 to about 3.5:1.

Any of the absorbent pads can have any desired basis weight and is typically in a range of from, for example, about 0.001 g/cm² to about 0.25 g/cm². Further, the size of
5 any of the absorbent pads may vary depending on several considerations including, for example, the size of the dressing or bandage, and the size of the wound to be protected or treated. In any of the various embodiments of the invention, at least a portion of the absorbent pad can have a density of in a range of from about 0.1 to about 0.3 g/cm³.
Further, in any of the various embodiments of the invention, the at least a portion of the
10 absorbent pad can have a density in a range of less than about 0.1 g/cm³. In some configurations some embodiments of the invention, the absorbent layer can have a density in a range of from about 0.01 g/cm³ to about 0.05 g/cm³. The absorbent pad can have about 3 ounces per square yard of surface area to about 10 ounces/square yard of surface area. In some configurations of some embodiments of the invention, the
15 absorbent pad can have about 7 ounces per square yard of surface area.

The absorbent pad may include at least one therapeutic agent. A therapeutic agent is a compound which may provide a therapeutic or prophylactic effect. Some suitable examples of the at least one therapeutic agent include compounds that effect or participate in any one or more of tissue growth, cell growth, and cell differentiation.
20 Further, the at least one therapeutic agent can be an anti-adhesive compound, or a compound that may invoke a biological action, such as an immune response, or participate in one or more biological processes. The therapeutic agent may be applied to

and/or incorporated into the pad, or any other part of the dressing or adhesive bandage described herein in any suitable form, e.g., films, powders, liquids, and gels.

Examples of classes of therapeutic agents, which may be utilized in accordance with the present disclosure include anti-adhesives, antibacterial agents, antimicrobial agents, antibiotic agents, antifungal agents, antiviral agents, anticoagulants, anticonvulsants, antidepressants, analgesics, antipyretics, anesthetics, antiepileptics, antihistamines, anti-inflammatories, cardiovascular drugs, diagnostic agents, sympathomimetics, cholinomimetics, antimuscarinics, antispasmodics, hormones, growth factors, muscle relaxants, adrenergic neuron blockers, antineoplastics, immunogenic agents, immunological agents, immunosuppressants, gastrointestinal drugs, diuretics, steroids, lipids, lipopolysaccharides, polysaccharides, platelet activating drugs, clotting factors, and enzymes. It is also intended that combinations of therapeutic agents may be used.

Suitable antimicrobial agents, antifungal agents, antiseptic agents, or antibiotic agents which may be included as the at least one therapeutic agent include, for example, polyhexamethylene biguanides (PHMB); triclosan or 2,4,4'-trichloro-2'-hydroxydiphenyl ether; chlorhexidine and salts thereof, including chlorhexidine acetate, chlorhexidine gluconate, chlorhexidine hydrochloride, and chlorhexidine sulfate; silver and salts or complexes thereof, including silver acetate, silver benzoate, silver carbonate, silver citrate, silver iodate, silver iodide, silver lactate, silver laurate, silver nitrate, silver oxide, silver palmitate, silver protein, and silver sulfadiazine; polymyxin, tetracycline; aminoglycosidic antibiotics, such as, but not limited to, tobramycin and gentamicin; rifampicin; bacitracin; neomycin; chloramphenicol; miconazole; fluoroquinolone and

quinolone based agents such as oxolinic acid, norfloxacin, nalidixic acid, pefloxacin, enoxacin and ciprofloxacin; penicillins such as oxacillin and piperacillin; nonoxynols; fusidic acid, cephalosporins; and combinations thereof. In addition, antimicrobial proteins and peptides such as bovine lactoferrin and lactoferricin B may be utilized as the at least one
5 therapeutic agent. In accordance with some particular embodiments, any of the dressings or adhesive bandages described herein includes polyhexamethylene biguanide.

Other therapeutic agents can be local anesthetics; non-steroidal antifertility agents; parasympathomimetic agents; psychotherapeutic agents; tranquilizers; decongestants; sedative hypnotics; steroids; sulfonamides; sympathomimetic agents;
10 vaccines; vitamins; antimalarials; anti-migraine agents; anti-parkinson agents such as L-dopa; anti-spasmodics; anticholinergic agents such as oxybutynin; cough suppressants or antitussive agents; bronchodilators; cardiovascular agents such as coronary vasodilators and nitroglycerin; alkaloids; analgesics; narcotics such as codeine, dihydrocodeinone, meperidine, and morphine; non-narcotic agents such as salicylates, aspirin,
15 acetaminophen, and d-propoxyphene; opioid receptor antagonists such as naltrexone and naloxone; anti-cancer agents; anti-convulsants; anti-emetics; antihistamines; anti-inflammatory agents such as hormonal agents, hydrocortisone, prednisolone, prednisone, non-hormonal agents, allopurinol; indomethacin; phenylbutazon; prostaglandins and cytotoxic drugs; chemotherapeutic agents; and estrogens.

20 Other examples of suitable therapeutic agents, which may be included in any one or more of the backing layer or substrate, the absorbent pad, the adhesive layer, and the non-stick film include, viruses and cells; peptides, polypeptides and proteins, as well as analogs, muteins, and active fragments thereof; immunoglobulins; antibodies; cytokines

such as lymphokines, monokines, and chemokines; blood clotting factors; hemopoietic factors; interleukins such as IL-2, IL-3, IL-4, and IL-6; interferons such as β -IFN, α -IFN and γ -IFN; erythropoietin; nucleases; tumor necrosis factor; colony stimulating factors such as GCSF, GM-CSF, and MCSF; insulin; anti-tumor agents and tumor suppressors;

5 blood proteins such as fibrin, thrombin, fibrinogen, synthetic thrombin, synthetic fibrin, synthetic fibrinogen; gonadotropins such as FSH, LH, and CG; hormones and hormone analogs such as growth hormone; vaccines such as tumoral, bacterial and viral antigens; somatostatin; antigens; blood coagulation factors; growth factors such as nerve growth factor and insulin-like growth factor; bone morphogenic proteins; TGF-B; protein

10 inhibitors; protein antagonists; protein agonists; nucleic acids, such as antisense molecules, DNA, RNA, RNAi; oligonucleotides; polynucleotides; and ribozymes.

Anti-adhesive agents can be used to prevent adhesions from forming between the bandage and the wound or tissue surrounding the wound. Some examples of these agents include, but are not limited to, hydrophilic polymers such as poly(vinyl pyrrolidone),

15 carboxymethyl cellulose, hyaluronic acid, polyethylene oxide, polyvinyl alcohols, and combinations thereof.

An adhesive material or layer may be used to adhere the absorbent pad to the backing material and, in some cases, to secure the dressing or adhesive bandage to the skin of the user. The adhesive may be an aqueous solvent-based compound. In other

20 configurations, the adhesive may be a non-aqueous solvent-based compound. In some cases, the adhesive material may comprise amorphous polyolefins including amorphous polypropylene, ethylene copolymers such as ethylene vinyl acetate copolymers, and combinations thereof. Suitable adhesives also include acrylic based, dextrin based, and

urethane based adhesives as well as natural and synthetic elastomers, and blends thereof. In still other cases, the adhesive material may be a hot melt adhesive. Examples of suitable adhesive materials include, but are not limited to, those based on styrenic block copolymers and tackifying resins. The adhesives may also include any one or more of
5 tackifiers, anti-oxidants, and processing oils. Sources of commercially available adhesive components include Kraton Performance Polymers Inc., Houston, Texas; H.B. Fuller Company, St. Paul, Minnesota; Bostik Inc., Wauwatosa, Wisconsin; National Starch, Bridgewater, New Jersey; and REXtac, LLC, Odessa, Texas.

The adhesive can be applied in any desired manner such as by spraying, screen
10 printing, or slot die coating to suitable amount. The adhesive coating weight can vary from about 20 grams per square meter (gsm) to about 100 gsm. In embodiments of the invention, the adhesive may be applied to a permeable backing layer at an amount that maintains the permeability of the backing layer or substrate. For example, a backing layer comprised of woven or non-woven fibers may have a desired porosity between the
15 fibers prior to the application of the adhesive and after the application of the adhesive. In other embodiments of the invention, the adhesive may be applied in an amount that renders the porous backing layer impermeable to fluids.

Any of the dressings and bandages as disclosed herein may have any geometrical configuration and any suitable dimension. For example, the dressing or bandages can be
20 shaped to be square, rectangular, round, oval, or triangular. The size of the dressing or bandage will depend on the shape of the dressing or bandage and the size of the wound meant to be covered by the dressing or bandage. A square bandage may range in size from about 2 cm X 2 cm to about 15 cm X 15 cm. A rectangular bandage may range in

size from about 5 cm to about 15 cm, in some cases, from about 7.5 cm to about 12.5 cm and the width of the rectangular bandage may range from about 0.5 cm to 5 cm, in some cases, from about 1 cm to about 3 cm.

The dressing or bandage can have any suitable thickness, depending on the application or use. Typically, the thickness of the dressing or bandage can range from about 0.25 mm to about 5 mm; in some embodiments of the invention, the thickness can range from about 1 mm to about 3 mm; and in some further embodiments of the invention, the thickness can range from about 1 mm to about 2 mm.

FIGS. 1 and 2 exemplarily illustrate a dressing in accordance with some aspects of the invention. Adhesive bandage 10 can comprise a backing substrate 20 affixed to an absorbent pad 40 via an adhesive 30. Adhesive 30 is shown positioned along the entire length of backing substrate 20; however it is envisioned that adhesive 30 may be positioned along any portion of backing substrate suitable, such as for adhering the dressing as an adhesive bandage to skin or tissue. Non-stick film 50 can comprise a first polymeric material and a second polymeric material having a lower melting point than the first polymeric material. Non-stick film 50 can be affixed to the wound-facing side or surface of absorbent pad 40. Non-stick film 50 may be a film which includes a blend of a polyester and an amorphous polyester wherein the amorphous polyester displays a lower melting point than the first polyester material.

As exemplarily illustrated in FIGS. 3 and 4, a dressing 100 can comprise an absorbent pad 140, which can be optionally secured to a backing substrate (not shown) via an adhesive. Absorbent pad 140 can be positioned to be generally centered along the entire length of the backing substrate or along any portion thereof. The non-stick film

can comprise a first and a second polymeric layer. As exemplarily illustrated, second polymeric layer 150a can be affixed to the wound-facing surface of absorbent pad 140 and a first polymeric layer 150b of the non-stick film can be attached to the second polymeric layer 150a. The polymeric material of second polymeric layer 150a has a lower melting point than the polymeric material of the first polymeric layer 150b. In some embodiments of the invention, the second polymeric layer may be comprised, consist essentially of, or consist of an amorphous polyester and the first polymeric layer may be comprised of, consist essentially of, or consist of a different polyester, such as an at least partially crystalline polyester.

10 The dressing or bandages of the present invention may be of any suitable shape or size for covering a wound. As exemplarily illustrated in FIGS. 5 and 6, adhesive bandage 200 may be an island dressing and/or circular configuration with absorbent pad 240 affixed to a generally central portion of backing substrate 220 via, for example, an adhesive 230. As shown in FIG. 6, the non-stick film 250 can have a first layer 250b that is secured or affixed to absorbent pad 240 via a second layer 250a of the non-stick film at about around an outer perimeter of absorbent pad 240. Second layer 250a typically has a lower melting point than the melting point of the first polymeric layer 250b. In such an embodiment, first non-stick film 250a may create an opening or channel between second layer 250b and absorbent pad 240 to allow wound exudates to flow through during the wound healing process. Because the second polymeric layer 250a is advantageously positioned along the outer perimeter of the absorbent pad 240, the second polymeric layer 250a would likely not interfere with the absorption of wound exudates or other fluid through the central portion of absorbent pad 240. The non-stick film can have one or

more perforated regions 260, each of which can have a plurality perforations or apertures 270 through the thickness of the film.

The dressings and bandages of the present invention can be fabricated by providing a strip of backing substrate having the desired dimensions, and optionally applying an adhesive thereon. An absorbent pad is typically provided. Optionally, the absorbent pad may be adhered to a desired region of the backing substrate. A non-stick film may be secured to the absorbent pad by at least partially melting or softening a polymeric layer of the non-stick film, positioning the at least partially melted or softened non-stick film on the absorbent pad; and optionally applying pressure to disposed at least a portion of the melted or softened polymeric matrix in the absorbent pad. Release strips, such as siliconized paper, can optionally be placed over the exposed portions of adhesive-applied region as well as on the non-stick film. The bandage is then packaged by, for example, enclosing it between two layers of heat sealable paper, and heat sealing the periphery of the two paper layers. The packaged bandage can then be sterilized, if desired. When utilized, the absorbent pad, the non-stick film, or both can be immersed in a bath comprising the one or more therapeutic agent. The wet pads may be allowed to dry.

The absorbent pad may be made from a non-woven blend of fibers including viscose fibers, representing about 80% by weight of the pad and a polyester fiber representing about 20% by weight of the pad. The absorbent pad may initially be formed into long strips or rolls suitable for being cut into a multitude of smaller absorbent pads. The long strips or rolls of pads may then be passed through a solution containing a therapeutic agent, such as an antimicrobial agent like PHMB.

The composite assembly comprising the absorbent pad and the non-stick film may then be cut into a desired dimension.

It will be understood that various modifications may be made to the embodiments disclosed herein. For example, the adhesive bandage may be an absorbable bandage. In
5 another example, the adhesive bandages described herein may be sterilized using any suitable sterilization process, such as gamma radiation, and packaged into any suitable medical device package, such as an injectable medical device package. Thus, those skilled in the art can envision other modifications within the scope and spirit of the claims. Those skilled in the art should appreciate that the parameters and configurations
10 described herein are exemplary and that actual parameters and/or configurations will depend on the specific application in which the systems and techniques of the invention are used. For example, a unitary non-stick film may be utilized to wrap around any of the absorbent pads described herein, with the non-stick film having a plurality of polymeric regions or layers with differing melting points, melting ranges or softening points, and
15 with the absorbent pad having one or more layers or regions, each of which can have differing characteristics, and wherein each of the various polymeric layers of the non-stick film is a polyester with differing melting ranges and each of the layers of the absorbent pad utilizes 100% cotton fibers. Those skilled in the art should also recognize or be able to ascertain, using no more than routine experimentation, equivalents to the
20 specific embodiments of the invention. It is therefore to be understood that the embodiments described herein are presented by way of example only and that, within the scope of the appended claims and equivalents thereto; the invention may be practiced otherwise than as specifically described.

Moreover, it should also be appreciated that the invention is directed to each feature, system, subsystem, assembly, or subassembly, or technique described herein and any combination of two or more features, systems, subsystems, assembly, subassembly, or techniques described herein, if such features, systems, subsystems, assembly, subassembly, and techniques are not mutually inconsistent, is considered to be within the scope of the invention as embodied in the claims. Further, acts, elements, and features discussed only in connection with one embodiment are not intended to be excluded from a similar role in other embodiments.

As used herein, the term “plurality” refers to two or more items or components.

10 Use of ordinal terms, such as “first,” “second,” “third,” in the claims to modify a claim element does not by itself connote any priority, precedence, or order of one claim element over another or the temporal order in which acts of a method are performed, but are used merely as labels to distinguish one claim element having a certain name from another element having a same name, but for use of the ordinal term, to distinguish the claim

15 elements. The terms “comprising,” “including,” “carrying,” “having,” “containing,” and “involving,” whether in the written description or the claims, are open-ended terms. Thus, the use of such terms is meant to encompass the items listed thereafter, and equivalents thereof, as well as additional items. Only the transitional phrases “consisting of” and “consisting essentially of,” are closed or semi-closed transitional phrases,

20 respectively, with respect to the claims.

What is claimed is:

CLAIMS

1. A dressing for applying on a wound, comprising:
 - 5 an absorbent pad having a wound-facing surface and a second surface opposite from the wound-facing surface; and
 - a non-stick film secured to the absorbent pad on the wound-facing surface, the non-stick film having a first region comprising a first polymeric material and a second region comprising a second polymeric material having a lower melting point than the first
 - 10 polymeric material.
2. The dressing of claim 1, wherein the first polymeric material comprises a first thermoplastic polymer selected from the group consisting of polypropylene, polyvinylidene fluoride, polytetrafluoroethylene, polyvinylchloride, polyamide,
 - 15 polyethylene, polyvinyl alcohol, polyester, polystyrene, polymethylpentene, polyoxymethylene, and mixtures thereof, wherein the second polymeric material comprises a second thermoplastic polymer selected from the group consisting of polypropylene, polyvinylidene fluoride, polytetrafluoroethylene, polyvinylchloride, polyamide, polyethylene, polyvinyl alcohol, polyester, polystyrene, polymethylpentene,
 - 20 polyoxymethylene, and mixtures thereof, and wherein the second region defines a securing layer attaching the non-stick film to the wound-facing surface of the absorbent pad.

3. The dressing of any one of the preceding claims, wherein the first polymeric material consists essentially of a first polyester and the second polymeric material consists essentially of a second polyester.

5 4. The dressing of any one of the preceding claims, wherein the second polymeric material comprises an amorphous polymer having a melting temperature range in a range of from about 120°C to about 200°C and the first polymeric material comprises polyethylene terephthalate having a melting temperature range in a range of from about 200°C to about 275°C.

10

5. The dressing of any one of the preceding claims, wherein the second polymeric material comprises polyethylene terephthalate having a glass transition temperature in a range of from about 60°C to about 88°C.

15 6. The dressing of any one of the preceding claims, further comprising a second film secured to the absorbent pad on the second surface thereof, the second film having a third region comprising the first polymeric material and a fourth region comprising the second polymeric material, and wherein the fourth region defines a second securing layer attaching the second film to the second surface of the absorbent pad.

20

7. The dressing of any one of the preceding claims, further comprising a backing substrate having an adhesive material on a surface thereof.

8. The dressing of claim 7, wherein the backing substrate comprises a woven fabric and the adhesive material comprises an acrylic.
9. The dressing of any one of the preceding claims, wherein the non-stick film has a
5 perforated region including a plurality of perforations extending through the thickness thereof, and wherein the absorbent pad comprises a fiber selected from the group consisting of viscose, cotton, fiberized paper pulp, lyocell, polypropylene, and polyester fibers, and combinations thereof.
- 10 10. The dressing of any one of the preceding claims, wherein the absorbent pad has a first, absorbent layer comprising a low density absorbent fabric and a second, wicking layer comprising a high density absorbent fabric.
11. The dressing of any one of the preceding claims, wherein the absorbent pad
15 comprises polyhexamethylene biguanide.
12. A method of producing a wound dressing, comprising:
providing a non-stick film having a first region comprising a first polymeric material and a second region comprising a second polymeric material; and
20 securing the non-stick film to an absorbent pad at a wound-facing surface thereof.
13. The method of claim 12, wherein providing the non-stick film having the first region comprising the first polymeric material and the second region comprising the

second polymeric material comprises providing the first polymeric material having a melting range in a range of from about 200°C to about 275°C, and providing the second polymeric material having a melting range in a range of from about 120°C to about 200°C.

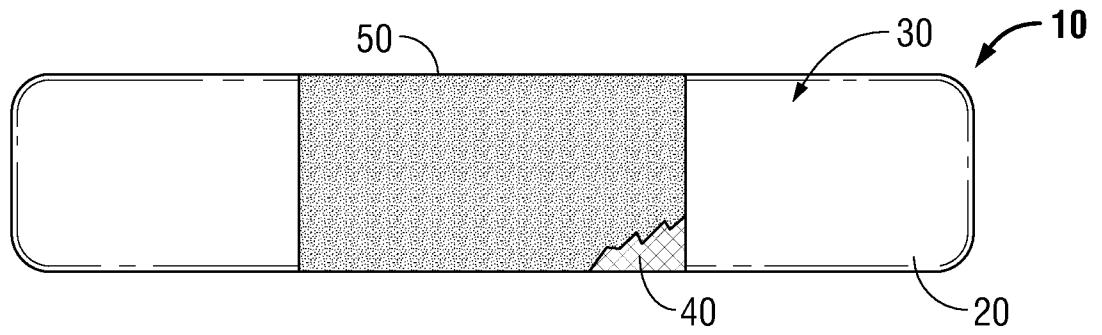
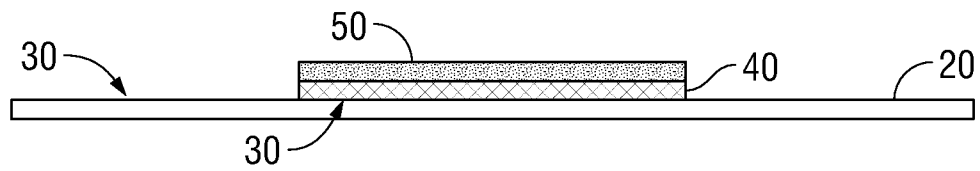
5

14. The method of any one of claims 12-13, wherein securing the non-stick film to the absorbent pad comprises exposing the non-stick film to an environment with a temperature in a range of from about 140°C to about 200°C.

10 15. The method of any one of claims 12-14, further comprising:

immersing at least a portion of the absorbent pad in a fluid comprising polyhexamethylene biguanide to produce a PHMB-immersed pad; and drying the PHMB-immersed pad to produce a PHMB-containing pad, and

15 wherein securing the non-stick film to the absorbent pad comprises securing the second region of the non-stick film to the PHMB-containing pad.

**FIG. 1****FIG. 2**

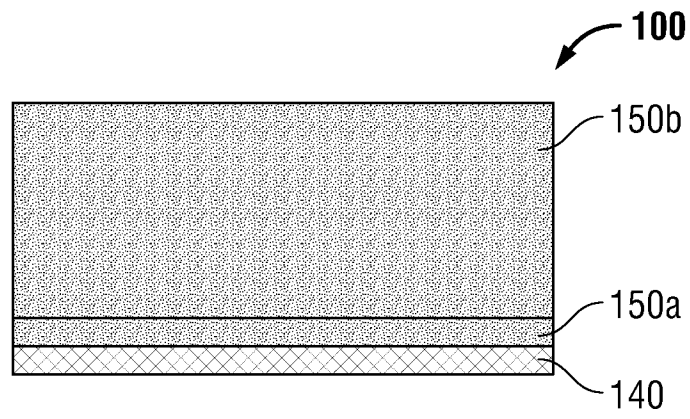


FIG. 3

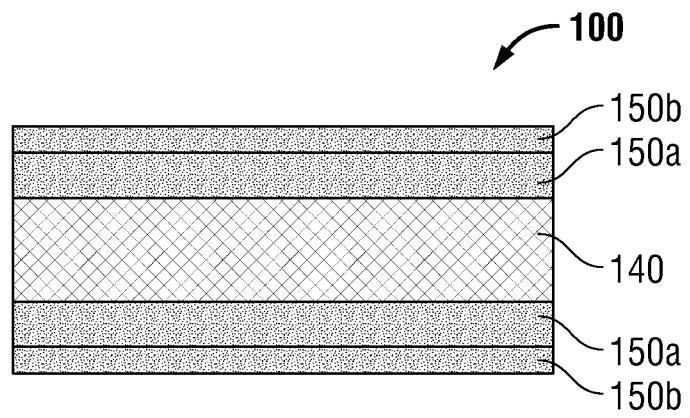


FIG. 4

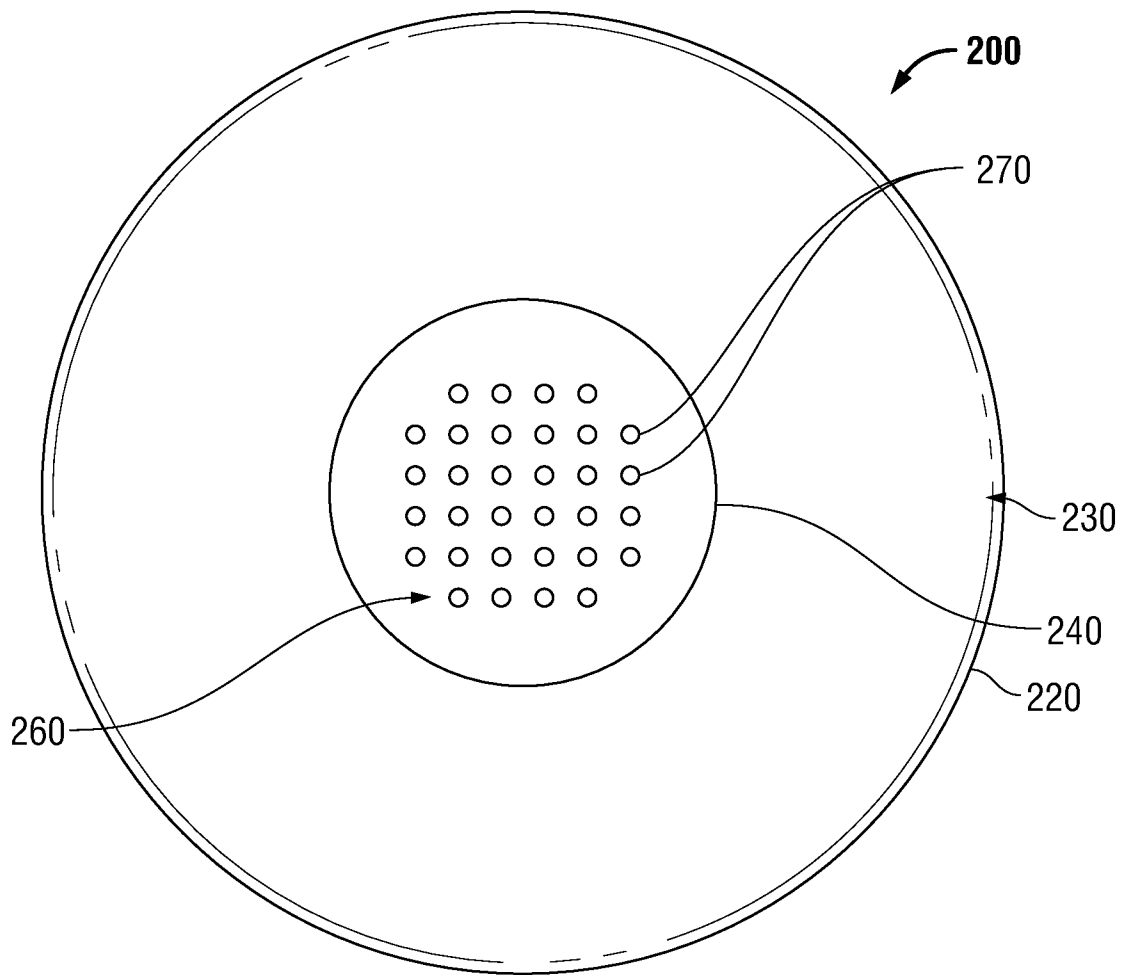


FIG. 5

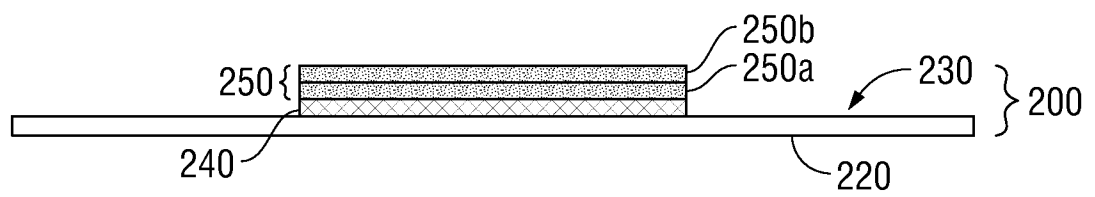


FIG. 6