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(54) **ADHESIVE HYDROPHILIC PAD FOR ULTRASOUND TRANSDUCER**

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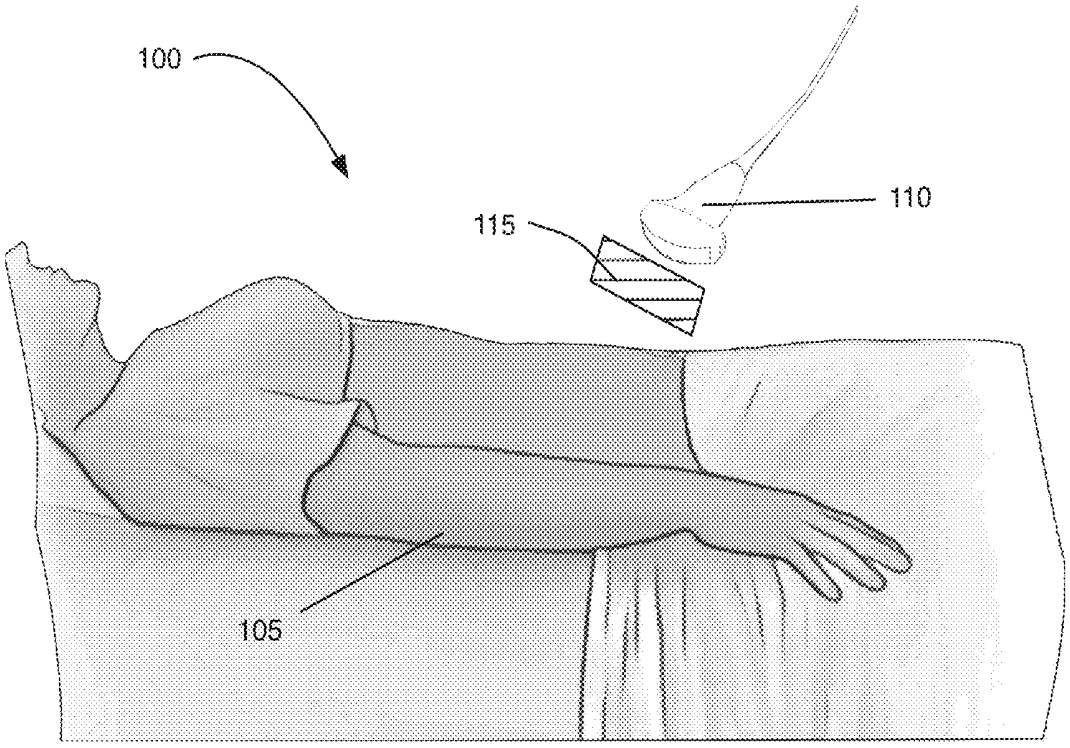
(52) **U.S. Cl.**
CPC ***A61B 8/4281*** (2013.01); *A61L 31/14* (2013.01)

(57) **ABSTRACT**

An ultrasound transducer interface pad includes a first substrate layer having a first surface and a second surface. A hydrophilic layer is formed on the first surface of the first substrate, wherein the hydrophilic layer is configured to be hydrated to provide an acoustic coupling between the ultrasound transducer and a patient. The interface pad further includes a second substrate layer having a third surface and a fourth surface. A first adhesive layer is formed on the third surface of the second substrate and configured to adhere to the second surface of the first substrate layer and a second adhesive layer is formed on the fourth surface of the second substrate and configured to adhere to one of: an operational portion of an ultrasound transducer or a patient.



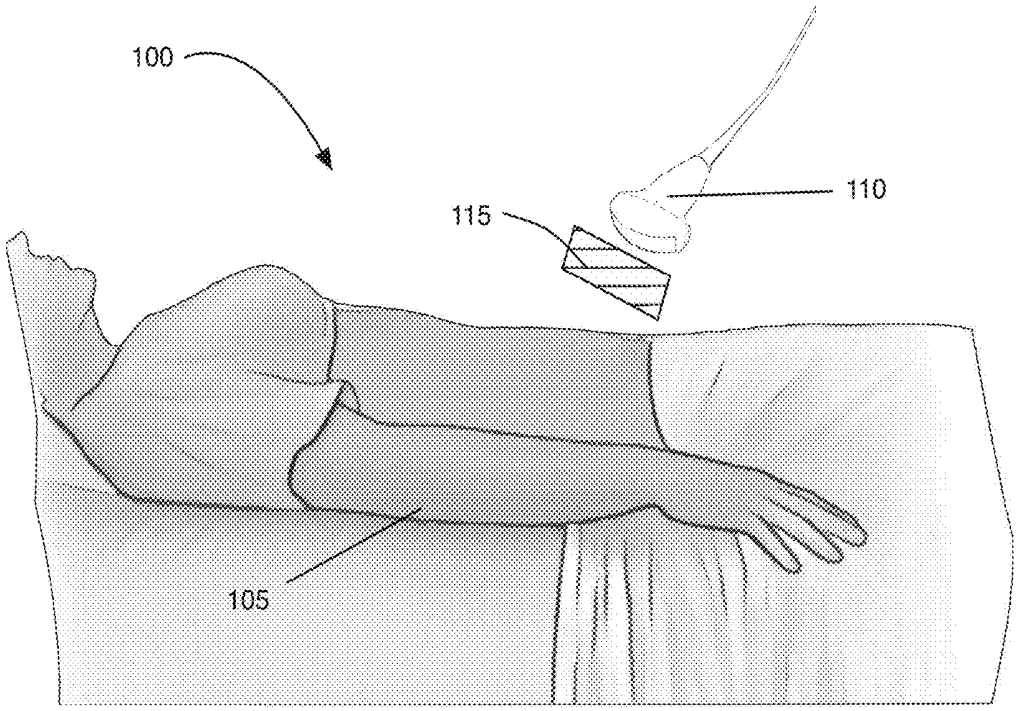


FIG. 1A

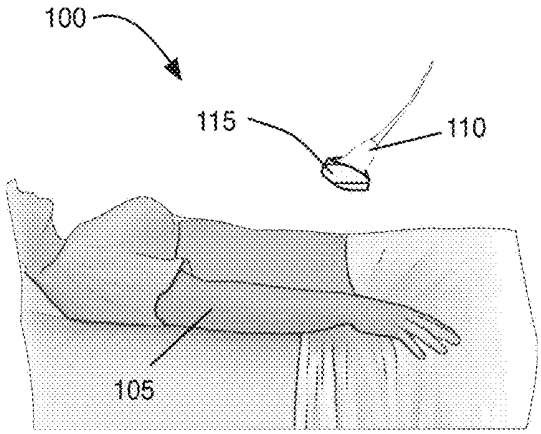


FIG. 1B

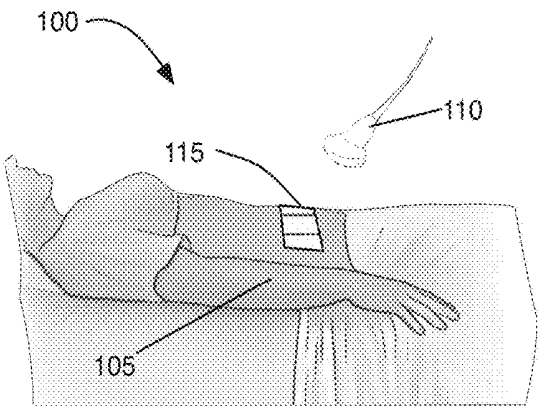


FIG. 1C

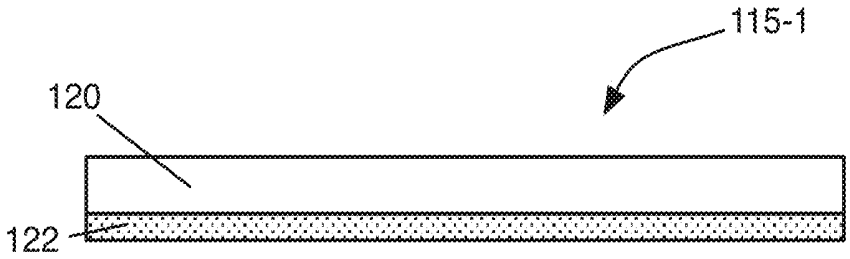


FIG. 2A

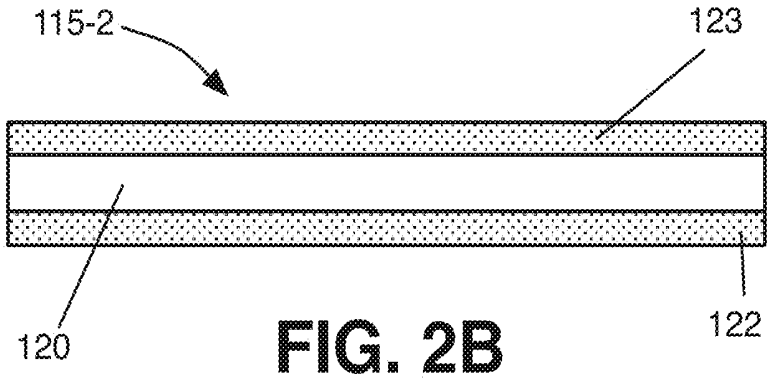


FIG. 2B

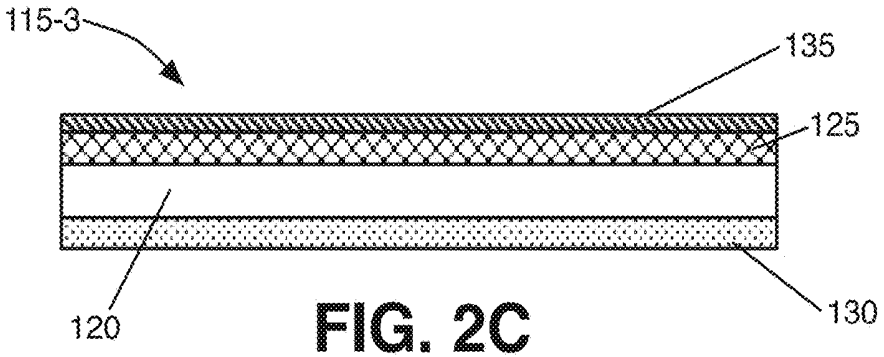


FIG. 2C

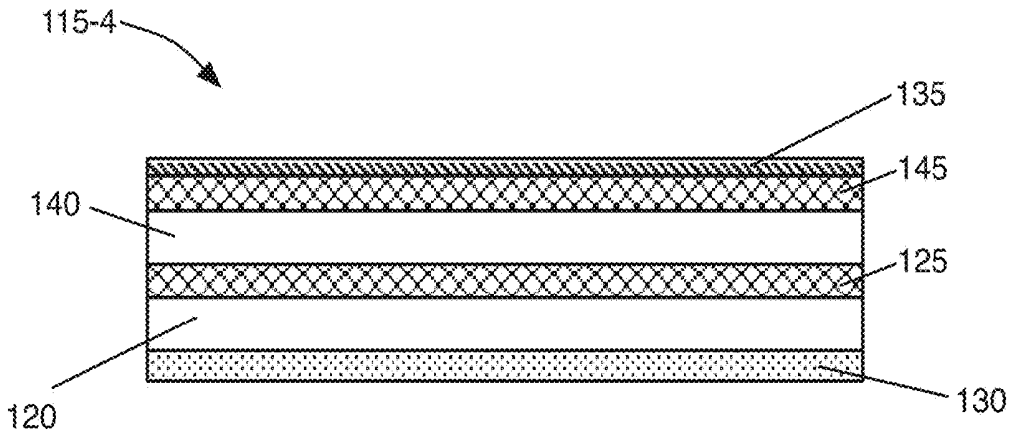


FIG. 2D

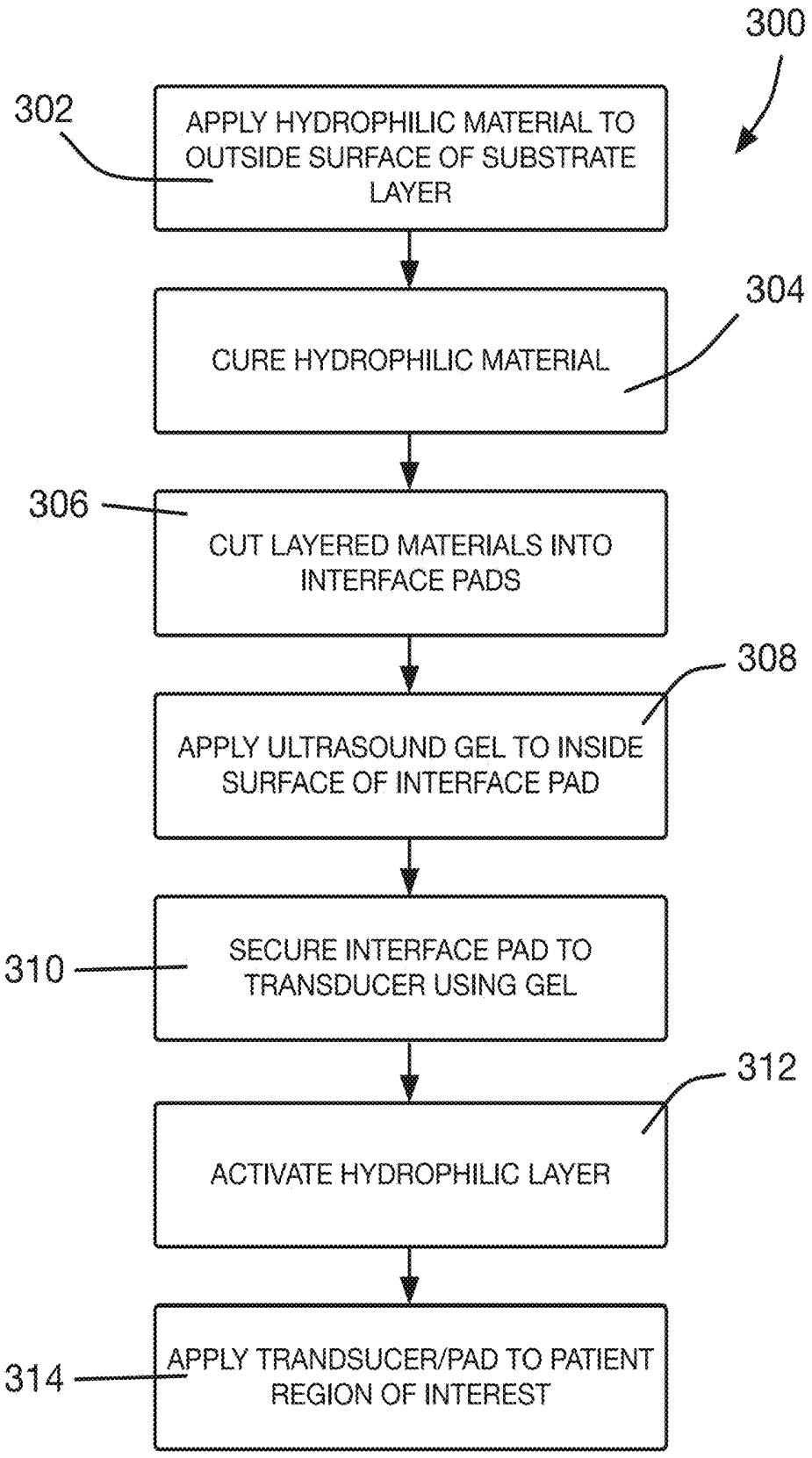

300
302
APPLY HYDROPHILIC MATERIAL TO OUTSIDE SURFACE OF SUBSTRATE LAYER
304
CURE HYDROPHILIC MATERIAL
306
CUT LAYERED MATERIALS INTO INTERFACE PADS
308
APPLY ULTRASOUND GEL TO INSIDE SURFACE OF INTERFACE PAD
310
SECURE INTERFACE PAD TO TRANSDUCER USING GEL
312
ACTIVATE HYDROPHILIC LAYER
314
APPLY TRANDSUCER/PAD TO PATIENT REGION OF INTEREST

FIG. 3A

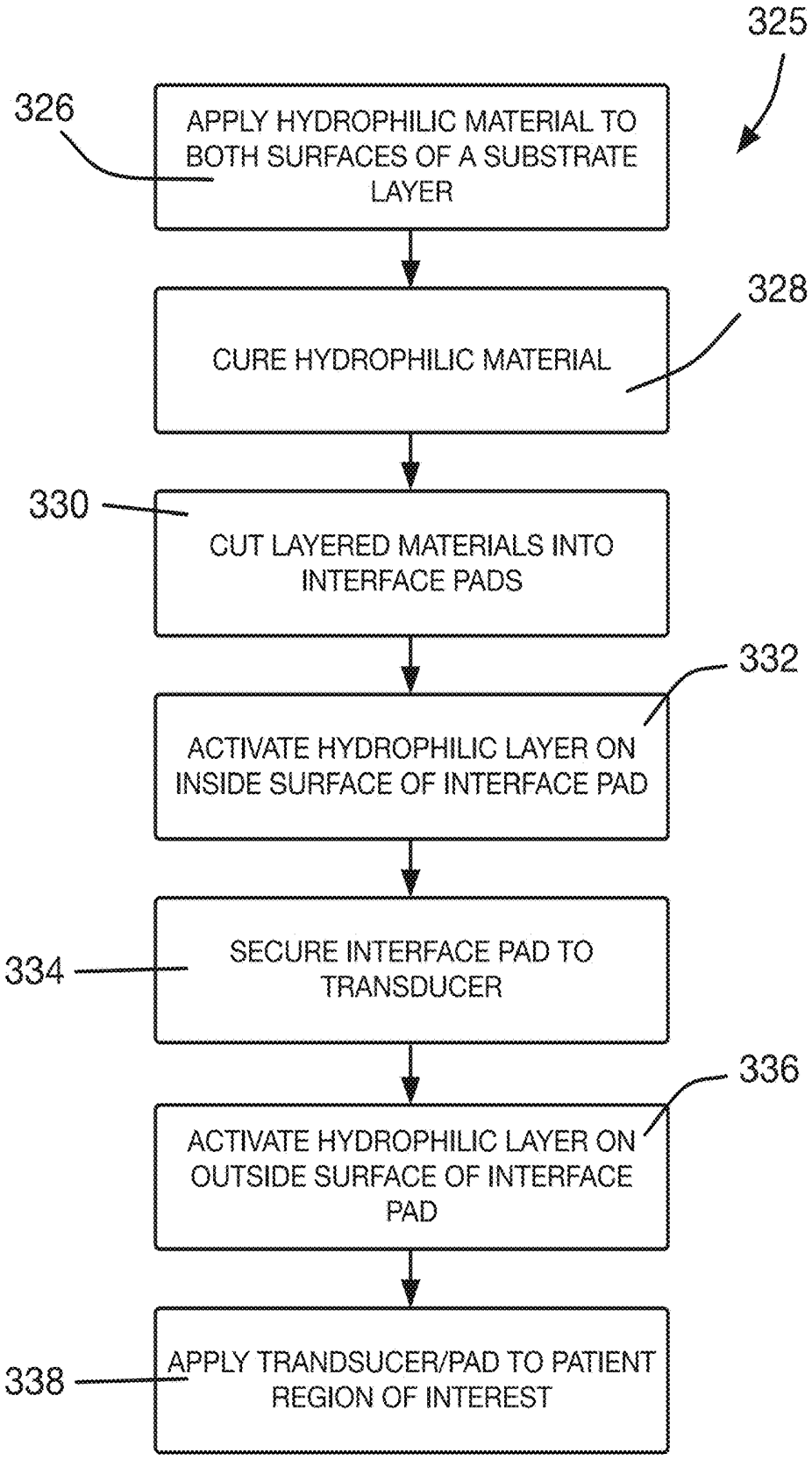

325
326
APPLY HYDROPHILIC MATERIAL TO BOTH SURFACES OF A SUBSTRATE LAYER
328
CURE HYDROPHILIC MATERIAL
330
CUT LAYERED MATERIALS INTO INTERFACE PADS
332
ACTIVATE HYDROPHILIC LAYER ON INSIDE SURFACE OF INTERFACE PAD
334
SECURE INTERFACE PAD TO TRANSDUCER
336
ACTIVATE HYDROPHILIC LAYER ON OUTSIDE SURFACE OF INTERFACE PAD
338
APPLY TRANDSUCER/PAD TO PATIENT REGION OF INTEREST

FIG. 3B

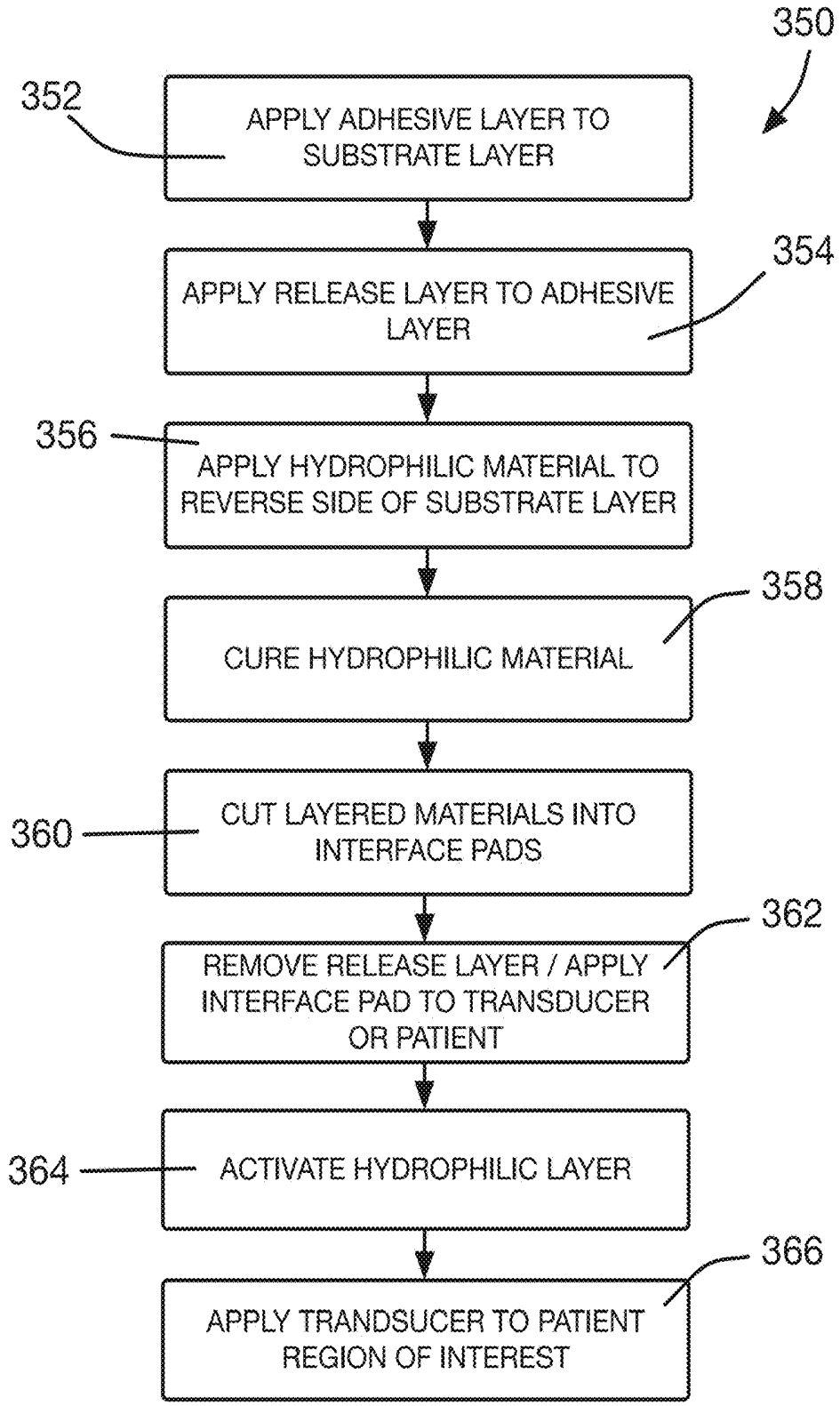

350
352
APPLY ADHESIVE LAYER TO SUBSTRATE LAYER
354
APPLY RELEASE LAYER TO ADHESIVE LAYER
356
APPLY HYDROPHILIC MATERIAL TO REVERSE SIDE OF SUBSTRATE LAYER
358
CURE HYDROPHILIC MATERIAL
360
CUT LAYERED MATERIALS INTO INTERFACE PADS
362
REMOVE RELEASE LAYER / APPLY INTERFACE PAD TO TRANSDUCER OR PATIENT
364
ACTIVATE HYDROPHILIC LAYER
366
APPLY TRANDSUCER TO PATIENT REGION OF INTEREST

FIG. 3C

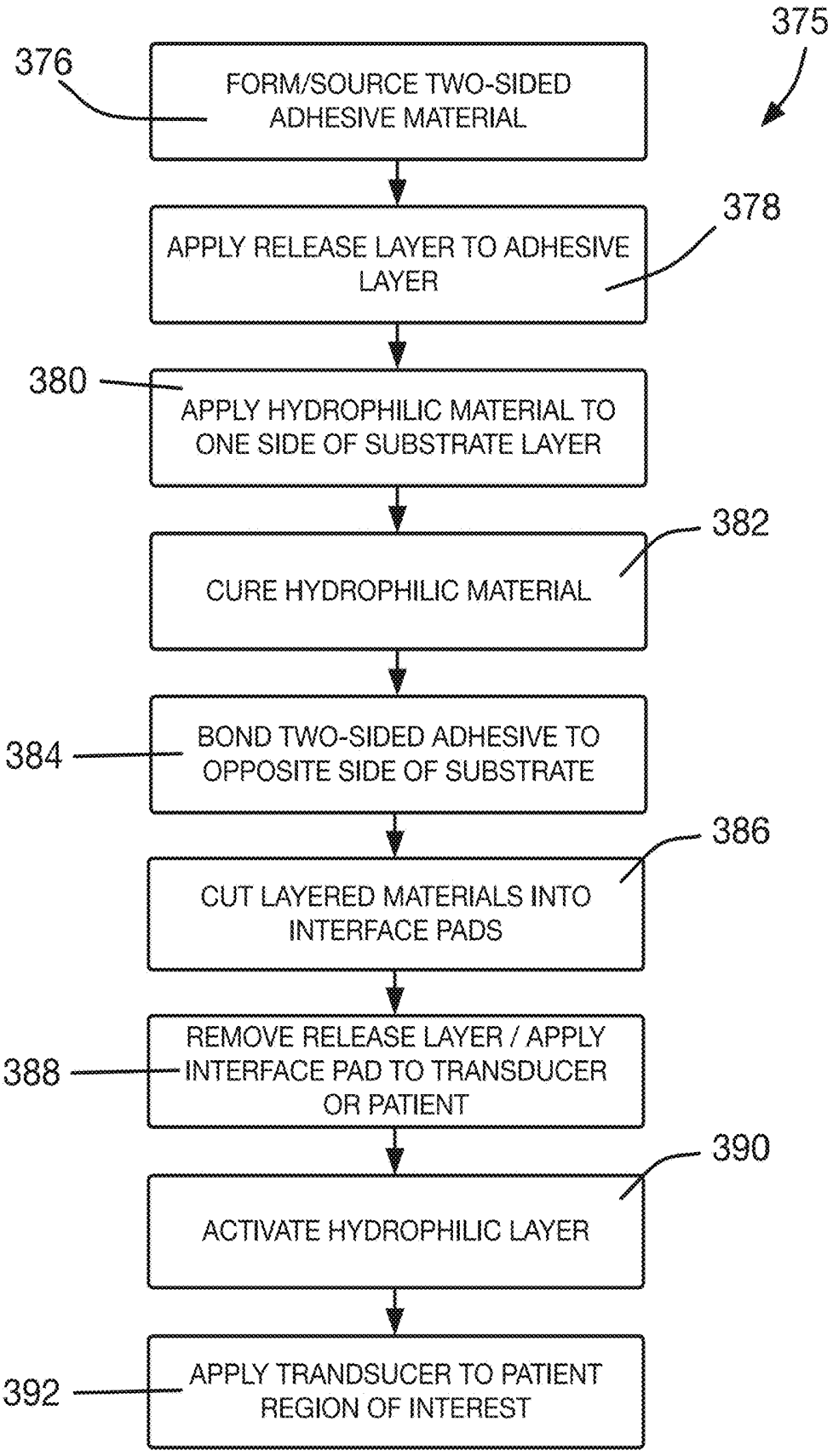

375
376
FORM/SOURCE TWO-SIDED ADHESIVE MATERIAL
378
APPLY RELEASE LAYER TO ADHESIVE LAYER
380
APPLY HYDROPHILIC MATERIAL TO ONE SIDE OF SUBSTRATE LAYER
382
CURE HYDROPHILIC MATERIAL
384
BOND TWO-SIDED ADHESIVE TO OPPOSITE SIDE OF SUBSTRATE
386
CUT LAYERED MATERIALS INTO INTERFACE PADS
388
REMOVE RELEASE LAYER / APPLY INTERFACE PAD TO TRANSDUCER OR PATIENT
390
ACTIVATE HYDROPHILIC LAYER
392
APPLY TRANDSUCER TO PATIENT REGION OF INTEREST

FIG. 3D

ADHESIVE HYDROPHILIC PAD FOR ULTRASOUND TRANSDUCER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority to and is a continuation-in-part of U.S. patent application Ser. No. 16/139,625, filed Sep. 24, 2017, which claims priority to U.S. Provisional Patent Application No. 62/565,736, filed Sep. 29, 2017, the entirety of which are hereby incorporated by reference herein.

BACKGROUND

[0002] This invention relates to medical devices and more particularly to ultrasound transducers and devices for covering the ultrasound transducer for use in external, intraoperative, or endocavity applications.

[0003] Ultrasound transducers are commonly used in clean, but non-sterile environments, such as patient examination rooms. In many typical ultrasound procedures, such as prenatal abdominal ultrasounds, bladder or other organ screenings, transesophageal echocardiography, etc., an acoustic ultrasound gel is applied to a supine patient's abdomen and an ultrasound transducer is positioned to contact the gel and is moved around the abdomen to acquire ultrasound images. Once the procedure is complete, both the patient and the ultrasound transducer must be cleaned of gel. In circumstances in which time between procedures is a concern, the cleaning process negatively impacts productivity.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. **1**A-**1**C illustrate an environment in which embodiments described herein may be implemented;

[0005] FIGS. **2**A-**2**D are cross-sectional views of an exemplary implementation of the interface pad of FIG. **1** and

[0006] FIGS. **3**A-**3**D are flow charts illustrating exemplary processes of forming and using an ultrasound transducer interface pad in accordance with embodiments described herein.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0007] The following detailed description refers to the accompanying drawings. The same reference numbers in different drawings may identify the same or similar elements. Also, the following detailed description does not limit the invention

[0008] Implementations described herein relate to materials for providing an effective and easy to use interface between an ultrasound transducer and a patient. Consistent with one implementation described herein, a disposable transducer interface includes a multi- layer configuration, hereinafter referred to as a "pad," for engaging an operating end of the transducer on one side and a patient's skin on the opposite side. In one embodiment, the multi-layer interface pad includes a carrier layer, with an adhesive layer and a hydrophilic layer applied to opposing sides of the carrier layer. During use, the adhesive layer side of the pad removably adheres to the transducer (or patient) to provide a positive, consistent coupling between the pad and the transducer. The hydrophilic layer is then hydrated to provide a positive acoustic coupling that facilitates clear and efficient transmission of ultrasound signals therethrough and eliminates the need to use traditional acoustic coupling gel.

[0009] FIG. **1**A-**1**C illustrate an environment **100** in which embodiments described herein may be implemented. As shown in FIG. **1**A, environment **100** includes a patient **105**, an ultrasound transducer **110**, and an interface pad **115**. During use, as shown in FIGS. **1**.B and **1**C, interface pad **115** may be used in one of two manners, in a first embodiment, as shown in FIG. **113**, interface pad **115** may be adhered, as described below, to the operational end of ultrasound transducer **110**, while in the second embodiment, as shown in FIG. **1**C, interface pad **115** may be adhered to patient **105**. In either embodiment, once affixed to either transducer **110** or patient **105**, pad **115** may be hydrated by applying a liquid, such as water, saline, lidocaine, chloraprep, isopropyl alcohol, or other like solution to the exposed surface to form an acoustically efficient interface and allow for easy movement (i.e., sliding) between transducer **110** and interface pad **115**. In some embodiments, a patient's bodily fluid or excretions may be sufficient to hydrate pad **115**. In such embodiments, external or added hydrating solutions may not be necessary.

[0010] FIG. **2**A-**2**D illustrate cross-sectional views of exemplary implementations of interface pad **115**, depicted as interface pads **115-1** to **115-4**, respectively, As shown in FIG. **2**A, interface pad **115-1** includes a substrate layer **120**, such as a polyurethane carrier or material having a thickness ranging from approximately 0.025 to 1.0 mm. Consistent with implementations described herein, substrate layer **120** may be formed in either a planar or non-planar (e.g., shaped) configuration depending on application. For example, in some embodiments, substrate layer **120** may have a shaped (e.g., three-dimensional) configuration corresponding to the ultrasound transducer onto which it is to be applied. In other embodiments, substrate layer **120** may be formed as a planar layer usable with a number of different transducers and in a variety of procedures. Furthermore, consistent with embodiments described here, substrate layer **120** may be formed in any feasible manner to accomplish the desired dimensions. For example, substrate layer **120** may be formed by extrusion, dipping, molding, chemical deposition, etc.

[0011] Consistent with embodiments described herein, interface pad **115-1** further includes a hydrophilic coating layer **122** applied to one side of substrate layer **120**. In this configuration, hydrophilic coating layer **122** is provided on an outside of interface pad **115** relative to transducer **110**.

[0012] In one embodiment, hydrophilic coating layer **122** includes an ultra-violet (UV) light or heat curable materials, such as polyvinylpyrrolidone/polyurethane (PVP/PU) or poly methacrylate (PM), having a thickness in the range of approximately 2 to 5 microns. During manufacture, hydrophilic coating layer **122** may be applied to the substrate layer **120** and cured via exposure to UV light or exposing the layer to heat.

[0013] During use, an acoustic coupling gel may be applied to an inside of substrate layer **120** prior to applying interface pad **115-1** to the ultrasound probe. Next, hydrophilic coating layer **122** may be activated using only water or saline to provide the requisite acoustic coupling interface between transducer **110** and patient **105**.

[0014] Consistent with embodiments described herein, interface pad **115-1** may be formed of any suitable shape or dimensions consistent with the particular ultrasound transducer or patient body part with which it is to be used. For

example, in one embodiment, interface pad **115-1** may be formed in a rectangular configuration having a length of approximately 5 inches and a width of approximately 3.25 inches.

[0015] FIG. **2**B illustrates an embodiment of interface pad **115-2** that includes a second hydrophilic coating layer **123** applied on a side of substrate layer **120** opposite from hydrophilic coating layer **122**. During use, hydrophilic coating layers **122** and **123** may each be activated using only water or saline to provide the requisite acoustic coupling interface between transducer **110** and patient **105**.

[0016] In another implementation, as shown in FIG. **2**C, interface pad **115-3** includes substrate layer **120**, an adhesive layer **125**, a hydrophilic coating layer **130**, and a removable release layer **135**. In one embodiment, substrate layer **120** comprises a polyurethane film carrier or material, such as polyether polyurethane having a thickness ranging from approximately 0.025 to 1.00 millimeters (mm).

[0017] In some implementations, adhesive layer **125** may include a silicone-based adhesive, having, for example, an adhesion (or removal force) of between 0.2 and 0.8 Newtons (N) per 25 millimeters (mm). The relatively low removal force of such a silicon-based adhesive renders interface pad **115-3** generally repositionable after initial deployment. Furthermore, such silicone-based adhesives are capable of sticking to itself without destroying the product during initial deployment, repositioning or removing.

[0018] In other embodiments, adhesive layer **125** may include an acrylic or synthetic rubber-based adhesive material. Such non-silicone-based adhesives, may exhibit significantly higher removal forces (e.g., as high as 16.7 N per 25 mm). An adhesive having a higher removal force may be desirable in some circumstances, such as where slippage of the pad during use is a concern.

[0019] Consistent with embodiments described herein, adhesive layer **125** is applied (e.g., coated) onto substrate layer **120** at a coat weight ranging from approximately 100 to 200 grams per square meter (gsm), and preferably at a coat weight of 150 gsm, resulting in adhesive layer **125** having an applied thickness ranging from 0.025 to 0.2 mm (e.g., 0.15 mm).

[0020] As shown in FIG. **2**C, hydrophilic coating layer **130** is applied to substrate layer **120** on an opposite side of substrate layer **120** relative to adhesive layer **125**. During manufacture and prior to use, interface pad **115-3** includes a release layer **135** (also referred to as a liner or release liner) that is provided on adhesive layer **125** to protect the tackiness of adhesive layer **125** and to prevent adhesive layer **125** from adhering to other items or itself prior to use. In one implementation, release layer **135** comprises a polycarbonate layer. Consistent with embodiments described herein, release layer **135** is removed (e.g., peeled off) prior to using interface pad **115-3**, e.g., prior to adhering interface pad **115** to transducer **110**/patient **105**. In some embodiments, release layer **135** may include an edge area or slit that allows release layer **135** to be easily removed when interface pad **115-3** is ready for use.

[0021] Although interface pad **115-3** of FIG. **2**C is described above as including three distinct layers **120-130** and a release layer **135**, in other implementations, interface pad **115** may be formed of only two layers, with an adhesive layer **125** being applied directly to hydrophilic coating layer **130**, without the requirement of an underlying polyurethane substrate layer.

[0022] FIG. **2**D depicts interface pad **115-4** that includes substrate layer **120** and hydrophilic layer **130**, as described above in relation to FIG. **2**C. In addition, interface pad **115-4** includes a second substrate layer **140** sandwiched between adhesive layer **125** and a second adhesive layer **145**. In some implementations, this combination of adhesive layer **125**, second substrate layer **140**, and second adhesive layer **145** is formed independently of substrate layer **120** and hydrophilic coating layer **130**. During manufacture, adhesive layer **125** (previously joined with second substrate **140** and second adhesive layer **145**) is joined with initial substrate **120**, the opposite side of which includes hydrophilic coating layer **130**.

[0023] In one embodiment, second substrate layer **140** and initial substrate layer **120** each comprises a polyurethane film carrier or material, such as polyether polyurethane having a thickness ranging from approximately 0.025 to 1.00 millimeters (mm). In some implementations, adhesive layers **125/145** may include a silicone-based adhesive, having, for example, an adhesion (or removal force) of between 0.2 and 0.8 Newtons (N) per 25 millimeters (mm). The relatively low removal force of such a silicon-based adhesive renders interface pad **115-4** generally repositionable after initial deployment. Furthermore, such silicone-based adhesives are capable of sticking to itself without destroying the product during initial deployment, repositioning or removing.

[0024] In other embodiments, adhesive layers **125/145** may include an acrylic or synthetic rubber-based adhesive material. Such non-silicone-based adhesives, may exhibit significantly higher removal forces (e.g., as high as 16.7 N per 25 mm). An adhesive having a higher removal force may be desirable in some circumstances, such as where slippage of the pad during use is a concern.

[0025] In still other embodiments, adhesive layer **125** may include a different material than adhesive layer **145**. For example, adhesive layer **125** may include an acrylic or synthetic rubber-based adhesive material and adhesive layer **145** may include silicone-based adhesive.

[0026] Consistent with embodiments described herein, adhesive layers **125/145** are applied (e.g., coated) onto second substrate layer **140** at a coat weight ranging from approximately 100 to 200 grams per square meter (gsm), and preferably at a coat weight of 150 gsm, resulting in adhesive layers **125/145** each having an applied thickness ranging from 0.025 to 0.2 min (e.g., 0.15 mm).

[0027] During manufacture and prior to use, interface pad **115-4** also includes release layer **135** (also referred to as a liner or release liner) that is provided on second adhesive layer **145** to protect the tackiness of second adhesive layer **145** and to prevent second adhesive layer **145** from adhering to other items or itself prior to use. In one implementation, release layer **135** comprises a polycarbonate layer. Consistent with embodiments described herein, release layer **135** is removed (e.g., peeled off) prior to using interface pad **115**, e.g., prior to adhering interface pad **115-4** to transducer **110**/patient **105**. In some embodiments, release layer **135** may include an edge area or slit that allows release layer **135** to be easily removed when interface pad **115** is ready for use.

[0028] in other implementations, although not depicted in FIG. **2**D, a second release layer may be applied to a surface of adhesive layer **125** opposite to second substrate **140** prior to application of adhesive layer **125** to initial substrate **120**.

In this manner, the adhesive layer **125**/second substrate **140**/second adhesive layer **145** combination may be protectively stored prior to use.

[0029] FIGS. **3**A-3D illustrate flow charts illustrating exemplary processes **300**, **325**, and **350**, and **375**, respectively of forming and using an ultrasound transducer interface pad in accordance with embodiments described herein, with process **300** corresponding to the embodiment of FIG. **2**A, process **325** corresponding to the embodiment of FIG. **2**B, process **350** corresponding to the embodiment of FIG. **2**C, and process **375** corresponding to the embodiment of FIG. **2**D.

[0030] Referring to FIG. **3**A, a hydrophilic material may be coated onto one side of a substrate material (block **302**). For example, hydrophilic lay ay be coated (e.g., sprayed, brushed, etc.) On a side of a sheet of polyurethane substrate. As described above, as a precursor to the application of hydrophilic layer **122**, the substrate material substrate layer **120**) may be initially formed into a desired configuration using a suitable manufacturing technique, such as extrusion, dipping, molding, deposition, etc.

[0031] At block **304**, the hydrophilic material is cured, such as via heat or UV light. At block **306**, one or more interface pads **115** are cut to a desired size and/or shape, such as with a die cut machine.

[0032] At block **308**, a traditional ultrasound coupling gel is applied to an inside surface of an interface pad **115-1**. Next, interface pad **115-1** is applied to an operating end of ultrasound transducer **110** to secure interface pad **115-1** to transducer **110** (block **310**). Next, the hydrophilic layer is activated (block **312**). For example, a water or saline may be applied to hydrophilic layer **122**. Finally, the ultrasound transducer with the activated interface pad secured thereto is applied to a region of interest on a patient (block **314**).

[0033] Referring to FIG. **3**B, a hydrophilic material may be coated onto both sides of a substrate material (block **326**). For example, hydrophilic layers **122** and **123** may be coated (e.g., sprayed, brushed, etc.) Onto the sides of a sheet of polyurethane substrate. At block **328**, the hydrophilic material is cured, such as via heat or UV light. In some implementations, hydrophilic layer application and curing are done independently for each of layers **122** and **123**. At block **330**, one or more interface pads **115-2** are cut to a desired size and/or shape, such as with a die cut machine.

[0034] At block **332**, one of the hydrophilic layers is activated. For example, hydrophilic layer **123** is activated using water or saline. Next, interface pad **115-2** is applied to an operating end of ultrasound transducer **110** to secure interface pad **115-2** to transducer **110** via the activated hydrophilic layer **123** (block **334**). Next, the other hydrophilic layer is activated (block **336**). For example, a water or saline may be applied to hydrophilic layer **122**. Finally, the ultrasound transducer with the activated interface pad secured thereto is applied to a region of interest on a patient (block **338**).

[0035] Referring to FIG. **3**C, an adhesive layer is initially applied to a substrate layer (block **352**). For example, a silicone adhesive material may be coated (e.g., poured, sprayed, brushed, etc.) onto a first surface of a polyurethane substrate layer, such as substrate layer **120** to form the adhesive layer. Next, a release layer, such as a polymeric or paper layer, may be applied to the adhesive layer to prevent the adhesive from losing tackiness or sticking to unintended materials (block **354**). For example, release layer **135** may be applied to a tacky side of adhesive layer **125**.

[0036] Next, a hydrophilic material may be coated on a reverse side of the substrate layer (block **356**). For example, hydrophilic layer **130** may be coated (e.g., poured, sprayed, brushed, etc.) On a side of substrate **120** opposite to adhesive layer **125**, At block **358**, the hydrophilic material is cured, such as via heat or UV light. At block **360**, one or more interface pads **115-3** are cut to a desired size and/or shape from the layered materials, such as with a die cut machine.

[0037] At block **362**, the release layer is removed, and the adhesive layer is applied to either to an operating end of an ultrasound transducer or directly to the region of interest on the patient. For example, release layer **135** is removed to expose the tacky side of adhesive layer **125** and the adhesive layer **125** is then applied to transducer **110** or patient **105**. Next, at block **364**, the hydrophilic layer is activated. For example, hydrophilic layer **130** is activated using water or saline. Finally, either the ultrasound transducer with the activated interface pad **115-3** secured thereto is applied to a region of interest on a patient or the ultrasound transducer is applied to the activated interface pad **115-3** secured to the patient (block **366**).

[0038] Referring to FIG. **3**D, a two-sided adhesive is formed and/or sourced (block **376**). For example, a material having second substrate **140**, sandwiched between adhesive layer **125** and second adhesive layer **145** is formed. One or more release layers, such as a polymeric or paper layer, may be applied to the adhesive layers **125**/**145** to prevent the adhesive from losing tackiness or sticking to unintended materials (block **378**). **100391** Next, a hydrophilic material may be coated on a reverse side of the substrate layer (block **380**). For example, hydrophilic layer **130** may be coated (e.g., poured, sprayed, brushed, etc.) one side of substrate **120**. At block **382**, the hydrophilic material is cured, such as via heat or UV light. At block **384**, the two-sided adhesive of blocks **376**/**378** is bonded to the side of the substrate layer opposite the hydrophilic layer. Next, one or more interface pads **115-4** are cut to a desired size and/or shape from the layered materials, such as with a die cut machine (block **386**).

[0039] At block **388**, the release layer is removed, and the adhesive layer is applied to either to an operating end of an ultrasound transducer or directly to the region of interest on the patient. For example, release layer **135** is removed to expose the tacky side of adhesive layer **145** and adhesive layer **155** is then applied to transducer **110** or patient **105**. Next, at block **390**, the hydrophilic layer is activated. For example, hydrophilic layer **130** is activated using water or saline. Finally, either the ultrasound transducer with the activated interface pad **115-4** secured thereto is applied to a region of interest on a patient or the ultrasound transducer is applied to the activated interface pad **115-4** secured to the patient (block **392**).

[0040] Consistent with embodiments described herein, the interface pad may be packaged as either a sterile or a non-sterile product for use in different medical environments or circumstances.

[0041] The foregoing description of exemplary implementations provides illustration and description but is not intended to be exhaustive or to limit the embodiments described herein to the precise form disclosed. Modifica-

tions and variations are possible in light of the above teachings or may be acquired from practice of the embodiments.

[0042] Although the invention has been described in detail above, it is expressly understood that it will be apparent to persons skilled in the relevant art that the invention may be modified without departing from the spirit of the invention. Various changes of form, design, or arrangement may be made to the invention without departing from the spirit and scope of the invention. Therefore, the above-mentioned description is to be considered exemplary, rather than limiting, and the true scope of the invention is that defined in the following claims.

[0043] No element, act, or instruction used in the description of the present application should be construed as critical or essential to the invention unless explicitly described as such. Also, as used herein, the article "a" is intended to include one or more items. Further, the phrase "based on" is intended to mean "based, at least in part, on" unless explicitly stated otherwise.

[0044] Use of ordinal terms such as "first," "second," "third," etc., in the claims to modify a claim element does not by itself connote any priority, precedence, or order of one claim element over another, the temporal order in which acts of a method are performed, the temporal order in which instructions executed by a device are performed, etc., 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 elements.

What is claimed is:

1. An ultrasound transducer interface pad, comprising:
- a first substrate layer having a first surface and a second surface;
- a hydrophilic layer formed on the first surface of the first substrate,
- wherein the hydrophilic layer is configured to be hydrated to provide an acoustic coupling between the ultrasound transducer and a patient;
- a second substrate layer having a third surface and a fourth surface;
- a first adhesive layer formed on the third surface of the second substrate and configured to adhere to the second surface of the first substrate layer; and
- a second adhesive layer formed on the fourth surface of the second substrate and configured to adhere to one of: an operational portion of an ultrasound transducer or a patient.

2. The ultrasound transducer interface pad of claim **1**, wherein at least one of the first substrate layer or the second substrate layer comprises a polyurethane film material.

3. The ultrasound transducer interface pad of claim **2**, wherein the polyurethane film material has a thickness ranging from approximately 0.025 to 1.00 millimeters.

4. The ultrasound transducer interface pad of claim **1**, wherein the hydrophilic layer comprises one of: an ultra-violet (UV) light or heat curable hydrophilic material.

5. The ultrasound transducer interface pad of claim **1**, wherein at least one of the first adhesive layer or the second adhesive layer comprises a silicone gel adhesive coating.

6. The ultrasound transducer interface pad of claim **5**, wherein the silicone gel adhesive coating has a thickness ranging from approximately 0.025 to 0.2 millimeters.

7. The ultrasound transducer interface pad of claim **6**, wherein the silicone gel adhesive coating has a coat weight in a range of 100 to 200 grams per square meter (gsm).

8. The ultrasound transducer interface pad of claim **5**, wherein the first adhesive layer comprises an acrylic or synthetic rubber-based adhesive material and the second adhesive layer comprises the silicone gel adhesive coating,
- wherein the acrylic or synthetic rubber-based adhesive material exhibits a higher removal force than the silicone gel adhesive coating.

9. The ultrasound transducer interface pad of claim **1**, further comprising:
- a release layer provided over the second adhesive layer,
- wherein the release layer is to be removed prior to adhering the second adhesive layer to the ultrasound transducer.

10. A method of making a disposable ultrasound transducer interface pad, comprising:
- applying a first adhesive coating to a first surface of a first substrate to form a first adhesive layer;
- applying a second adhesive coating to a second surface of the first substrate to form a second adhesive layer;
- applying a hydrophilic material to a third side of a second substrate to form a hydrophilic layer,
- wherein the hydrophilic material is configured to be hydrated to provide an acoustic coupling between the patient and an ultrasound transducer;
- curing the hydrophilic layer;
- bonding the first substrate to the second substrate via the second adhesive layer; and
- cutting the bonded first and second substrates to a desired size and shape to form one or more ultrasound transducer interface pads.

11. The method of claim **10**, wherein at least one of the first or second substrate layers comprise a polyurethane material.

12. The method of claim **11**, wherein the polyurethane layer has a thickness ranging from approximately 0.025 to 1.0 millimeters.

13. The method of claim **10**, further comprising:
- applying a release layer to the first adhesive layer.

14. The method of claim **10**, wherein at least one of the first or second adhesive coatings comprise a silicone gel adhesive material.

15. The method of claim **14**, wherein the silicone gel adhesive material has a thickness ranging from approximately 0.025 to 0.2 millimeters.

16. The method of claim **15**, wherein applying the first adhesive coating comprises:
- coating the silicone gel adhesive material at a coat weight in a range of 100 to 200 grams per square meter (gsm).

17. The method of claim **14**, wherein the first adhesive coating comprises an acrylic or synthetic rubber-based adhesive material and the second adhesive coating comprises the silicone gel adhesive coating,
- wherein the acrylic or synthetic rubber-based adhesive material exhibits a higher removal force than the silicone gel adhesive coating.

18. The method of claim **10**, wherein the hydrophilic material comprises one of: an ultra-violet (UV) light or heat curable hydrophilic material, and wherein curing the hydrophilic material comprises one of UV curing or heat curing the hydrophilic material.

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专利名称(译)	用于超声换能器的粘性亲水垫		
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摘要(译)

超声换能器接口垫包括具有第一表面和第二表面的第一基底层。亲水层形成在第一基板的第一表面上，其中亲水层配置成水合以在超声换能器和患者之间提供声耦合。界面垫还包括具有第三表面和第四表面的第二基底层。第一粘合剂层形成在第二基板的第三表面上，并配置成粘附到第一基板层的第二表面，第二粘合剂层形成在第二基板的第四表面上，并配置成粘附到以下之一：超声换能器或患者的操作部分。