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(54) **PHYSIOLOGICAL SENSOR HAVING REDUCED SENSITIVITY TO INTERFERENCE**

PHYSIOLOGISCHER SENSOR MIT VERRINGERTER EMPFINDLICHKEIT GEGENÜBER INTERFERENZ

DÉTECTEUR PHYSIOLOGIQUE AYANT UNE SENSIBILITÉ RÉDUITE AUX INTERFÉRENCES

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EP 2 434 942 B1

Description

BACKGROUND

[0001] Physiological sensors are often used in medical applications to help doctors diagnose, monitor, and treat patients. Some physiological sensors use spectroscopy to provide valuable information about the patient's body tissue. Spectroscopy generally refers to the dispersion of light as it travels through a medium. A physiological sensor employing near-infrared spectroscopy may be used to detect characteristics of various body tissues by transmitting and receiving near-infrared light through the body tissue, and outputting a signal to a controller that provides valuable information about the body tissue. A doctor may use this information to diagnose, monitor, and treat the patient.

[0002] To measure the intensity of the light that travels inside the tissue, the near-infrared spectroscopy sensor may use one or more large area photodiodes mounted onto a flexible circuit board within a sensor pad. Because the photodiodes have a high equivalent resistance of the p-n junction, the sensor is very sensitive to the electromagnetic interference from other devices, such as electrosurgical equipment, electrocardiogram devices, or power supplies from medical or other electronic devices. One way to reduce the sensitivity of the near-infrared spectroscopy sensor to these other devices includes enclosing the photodiodes in a Faraday shield made from a copper mesh or plastic film covered by a transparent conductive material, such as iridium oxide. However, the Faraday shield is expensive, decreases the sensitivity of the photodiodes to the near-infrared light generated by the sensor, and reduces the flexibility of the sensor. US 2008/0015424 describes an apparatus for determining tissue oxygenation such as arterial and venous oxygenation and cerebral oxygenation. The sensor interface comprises an isolating layer, which may be made of elastic material.

[0003] Accordingly, a sensor is needed that reduces or eliminates the effects of electronic devices without the added expense and/or decreased sensitivity in sensors employing the Faraday shield solution.

BRIEF DESCRIPTION OF THE FIGURES

[0004]

Figure 1 is an assembly view of an exemplary physiological sensor configured to be capacitively isolated from a patient; and

Figure 2 is an exemplary circuit diagram illustrating an equivalent circuit of the physiological sensor capacitively isolated from the patient.

DETAILED DESCRIPTION

[0005] A physiological sensor includes a light source, a light detector, and a sensor pad that is capacitively isolated from a patient When the sensor pad is placed on the patient, light from the light source travels through a portion of the patient's body and is at least partially received by the light source. The light source then outputs a signal to a signal ground that is indicative of oxygen saturation. However, electronic devices such as electrosurgical generators, electrocardiogram devices, power sources, or any other medical or non-medical devices near the sensor pad may interfere with the light received by the light detector. In particular, the electronic device may create a voltage potential between the patient and the sensor pad that generates an electromagnetic field that may be detected by the light detector. If detected, the electromagnetic field may affect the signal output by the light detector, causing false oxygen saturation readings. To remedy this, the sensitivity of the sensor may be reduced by capacitively isolating the sensor pad from the patient, which effectively reduces the voltage potential between the patient and the sensor pad and reduces the sensitivity of the sensor. Moreover, the sensitivity of the sensor may be further reduced by capacitively isolating the signal ground from the monitor.

[0006] Figure 1 is an assembly view of an exemplary physiological sensor 10 that is capacitively isolated from a patient on which the sensor 10 is placed. The sensor 10 includes a light source 12, such as a light emitting diode, that may be configured to generate light in a near-infrared region of the electromagnetic spectrum. A light detector 14, such as a photodiode, is in optical communication with the light source 12, and thus, may be configured to receive light in the same near-infrared region of the electromagnetic spectrum. This way, the sensor 10 may be configured be a pulse oximeter, tissue oximeter, or other device configured to detect oxygen saturation. Both the light source 12 and light detector 14 may be disposed on a sensor pad 16 such that the sensor pad 16 at least partially houses the light source 12 and the light detector 14. In one exemplary approach, the light source 12 may be disposed on a different sensor pad 16 than the light detector 14. Moreover, the sensor pad 16 may include any number of light sources 12 and/or light detectors 14. The sensor pad 16 includes openings 18 that allow light generated by the light source 12 to propagate through body tissue, as well as openings 18 that allow the light detector 14 to receive the light from the light source 14. To reduce the sensitivity of the sensor 10, the sensor pad 16 is capacitively isolated from the patient to a voltage potential between

the patient and the sensor pad 16.

[0007] In one exemplary approach, a first surface 20 of the sensor pad 16 is at least partially coated with a conductive adhesive and a second surface 22 of the sensor pad 16 is at least partially coated with a pressure sensitive adhesive 26 that is not conductive to capacitively isolate the patient from the sensor pad 16. The second surface 22 of the sensor pad 16 is on the underside of the sensor pad 16 as illustrated in Figure 1. Although coated on the second surface 22, the pressure sensitive adhesive 26 is illustrated in Figure 1 as separate piece than the sensor pad 16 because it would otherwise not be viewable in Figure 1. Moreover, the openings 18 for the light source 12 and the light detector 14 may further be defined by the second surface 22 and are thus illustrated in Figure 1 as being further defined by the pressure sensitive adhesive 26.

[0008] It is appreciated that one or both of the first and second surfaces 20 and 22 may be completely coated with the conductive adhesive and the pressure sensitive adhesive 26, respectively. The conductive adhesive may be any conductive adhesive, such as ARCare-8001 manufactured by Adhesive Research Corporation. The pressure sensitive adhesive 26 may be any adhesive that will adhere to the patient's skin. When attached, the sensor pad 16 is arranged such that the conductive adhesive is spaced from the patient. The distance between the conductive adhesive and the patient's skin may affect the capacitance C_p of the patient, discussed in further detail below (see Figure 2). For example, the capacitance C_p may be inversely related to the distance between the patient's skin and the conductive adhesive. In other words, as the distance between the conductive adhesive and the patient's skin increases, capacitance C_p decreases, and vice versa. Therefore, the thickness of the sensor pad 16 may be designed to make the capacitance C_p sufficiently small to reduce a field produced by the voltage difference between the patient and the sensor 10, yet large enough to capacitively isolate the patient from the sensor pad 16.

[0009] The capacitance C_p may be similar to the capacitance of a parallel-plate capacitor the patient's body represents one plate and the conductive adhesive on the first surface 20 represents the other plate. The first surface 20 has an area *A* and is separated from the patient's body by a distance d. From this, capacitance Cp is approximately equal to the following:

$$C_p = \varepsilon_0 \varepsilon_r A/d \qquad \text{(Equation 1)}$$

In Equation 1, C_p is the capacitance in Farads, and as discussed *above, A* is the area of overlap of the first surface 20 and the patient's body measured in square meters, and *d* is the distance between the first surface 20 and the patient's body measured in meters. The value ε_r is the dielectric constant of the material between the plates, which may be approximately equal to 1. The value ε_0 is the permittivity of free space where $\varepsilon_0 = 8.854 \times 10^{-12}$ F/m. Using this equation, a 3cm x 1cm sensor pad with a 1mm gap between the patient's body and the first surface 20 would have a capacitance C_p of approximately 3pF. However, this value of Cp is merely exemplary.

[0010] The sensor 10 itself may generate an electromagnetic field that may be received by and affect the light detectors 14. For example, the light source 12 and light detector 14 may be disposed on a printed circuit board 28 having traces 30. The spacing and configuration of the traces 30 may generate an electromagnetic field that interferes with the light detectors 14 in the same way a large voltage potential across the patient 44 and the sensor pad 16 may generate an electromagnetic field and affect the light detectors 14. To compensate for this type of electromagnetic field, the traces 30 on the printed circuit board 28 may be printed very close to one another to reduce the magnitude of any electromagnetic field generated therebetween. Moreover, the shape of the traces 30 may be such that there are few, if any, loops created. For example, the traces 30 may be configured to travel parallel to one another and in straight lines as much as possible, with few, if any, rounded edges. This will minimize a loop that may pick up a high frequency electromagnetic field from an interference current generated by an electrosurgical generator to the ground via the patient, as discussed in further detail below.

[0011] The sensor 10 may include other components, such as a light-blocking pad 32 disposed on the sensor pad 16 and over the printed circuit board 28 to reduce interference from ambient light, and a spacer 34 disposed between the light-blocking pad 32 and the printed circuit board 28. As illustrated, the spacer 34 may define openings 18 for each light source 12 and light detector 14. Further, the sensor 10 may include a shield 42 to protect signals transmitted from the light detector 14 to a signal ground 50 (see Figure 2) from interference. When packaged, the pressure sensitive adhesive 26 may be covered with a liner 38, which may further define openings 36, and a tab 40 to allow removal of the liner 38 and expose the pressure sensitive adhesive 26 on the second surface 22 prior to placing the sensor 10 on the patient 44.

[0012] Referring now to Figure 2, the physiological sensor 10 previously described may be used to detect oxygen saturation of a patient 44 without interference from an electronic device, such as an electrosurgical generator. Although illustrated as an electrosurgical generator, the electronic device 46 may be an electrocardiogram device, power supply, or any other medical or non-medical electronic device. The sensor 10 is in communication with an amplifier 48 having a signal ground 50 and a monitor 52. Namely, the light detector 14 outputs a current or voltage signal representative of

oxygen saturation. The amplifier 48 processes the signal and transmits the processed signal to the monitor 52 where the oxygen saturation may be graphically displayed to a user, such as a medical professional. The signal ground 50 may be connected to the sensor 10 via the conductive adhesive. In one exemplary approach, the conductive adhesive covers the entire first surface 20 of the sensor pad 16, and connects to the signal ground 50 via an exposed area of copper on the printed circuit board 28. This way, the signal ground 50 and the sensor 10 are at electrically the same potential, while capacitively isolated from the patient 44. Further, the shield 42 protects the signal transmitted from the light detector 14 to the signal ground 50 from interference..

[0013] The capacitance C_p between the patient 44 and the sensor pad 16 absorbs changes in voltage between the sensor pad 16 and the patient 44 causing interference with the sensor 10, and in particular, an electromagnetic field received by the light detectors 14. The changes in voltage potential may be caused by an electronic device 46 used with the patient 44 as well as various physical characteristics of the patient 44, such as the patient's height, weight, etc, may cause these changes in voltage.

[0014] To further reduce interference, the signal ground 50 may be capacitively isolated from the monitor 52, represented in Figure 2 as a signal isolation capacitance C_i. The isolation capacitance C_i includes a parasitic capacitance between components of the monitor 52 and amplifier 48, a capacitance between an octo-coupler and a capacitance between primary and secondary windings of an isolation transformer providing electrical power to the amplifier 48 and sensor 10. In one exemplary approach, the capacitance C_p between the patient 44 and the sensor pad 16 is greater than the signal isolation capacitance C_i, creating a voltage divider that decreases the electrical potential between the patient 44 and the light source 12. For example, the capacitance C_p between the signal ground 50 and the monitor 52 may be 0.1pF to 1.0pF, and the capacitance C_p between the patient 44 and the sensor pad 16 is greater than that. The signal isolation capacitance C_i may be tuned relative to the capacitance Cp between the patient 44 and the sensor pad 16 to control the reduction of interference.

[0015] The above description is intended to be illustrative and not restrictive. Many alternative approaches or applications other than the examples provided would be apparent to those of skill in the art upon reading the above description. The scope of the invention should be determined, not with reference to the above description, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. It is anticipated and intended that future developments will occur in the arts discussed herein, and that the disclosed systems and methods will be incorporated into such future examples. In sum, it should be understood that the invention is capable of modification and variation and is limited only by the following claims.

[0016] The present embodiments have been particularly shown and described, which are merely illustrative of the best modes. It should be understood by those skilled in the art that various alternatives to the embodiments described herein may be employed in practicing the claims without departing from the scope as defined in the following claims. It is intended that the following claims define the scope of the invention and that the method and apparatus within the scope of these claims and their equivalents be covered thereby. This description should be understood to include all novel and non-obvious combinations of elements described herein, and claims may be presented in this or a later application to any novel and non-obvious combination of these elements. Moreover, the foregoing embodiments are illustrative, and no single feature or element is essential to all possible combinations that may be claimed in this or a later application.

[0017] All terms used in the claims are intended to be given their broadest reasonable constructions and their ordinary meanings as understood by those skilled in the art unless an explicit indication to the contrary is made herein. In particular, use of the singular articles such as "a," "the," "said," etc. should be read to recite one or more of the indicated elements unless a claim recites an explicit limitation to the contrary.

Claims

1. A sensor (10) comprising:

a light source (12);
a light detector (14) in optical communication with said light source (12); and
a sensor pad (16) having a first surface (20) and a second surface (22) and the sensor pad (16) at least partially housing said light source (12) and said light detector (14),
characterised in that the first surface (20) is at least partially coated with a conductive adhesive, and the second surface is at least partially coated with a non-conductive pressure sensitive adhesive (26), wherein a thickness of said sensor pad (16) is configured to capacitively isolate the sensor pad from a patient (44).

2. A sensor (10) as set forth in claim 1, wherein said light source (12) is configured to generate light in a near-infrared region of an electromagnetic spectrum, optionally wherein said light detector (14) is configured to receive light in

the near-infrared region of the electromagnetic spectrum.

3. A sensor (10) as set forth in claim 1, further comprising a printed circuit board (28) having traces (30) configured to minimize a field effected created by said traces (30), and wherein said light source (12) and said light detector (14) are disposed on said printed circuit board (28).

4. A sensor (10) as set forth in claim 1, further comprising a light-blocking pad (32) disposed on sensor pad (16), optionally further comprising a spacer (34) disposed between said sensor pad (16) and said light-blocking pad (32).

5. A physiological sensor system comprising: a sensor (10) as claimed in any of the preceding claims; and an amplifier (48) in communication with said sensor (10), said amplifier (48) including a signal ground (50) and a monitor (52), wherein said sensor (10) is configured to be capacitively isolated from a patient based at least in part on a thickness of said sensor pad.

6. A system as set forth in claim 5, wherein said sensor (10) includes a printed circuit board (28) and said conductive adhesive is in communication with said signal ground (50) via an exposed area of said printed circuit board (28).

7. A system as set forth in claim 5, wherein said signal ground (50) is capacitively isolated from said monitor (52).

8. A system as set forth in claim 7, wherein the capacitance between said signal ground (50) and said monitor (52) is 0.1 pF to 1.0 pF.

9. A system as set forth in claim 5, wherein the sensor pad is adapted so that in use a capacitance between said sensor pad (16) and the patient (44) is greater than a capacitance between said signal ground (50) and said monitor (52).

10. A system as set forth in claim 9, wherein the capacitance between said sensor pad (16) and the patient (44) and the capacitance between said signal ground (50) and said monitor (52) creates a voltage divider that decreases an electrical potential between the patient (44) and the light source (12).

11. A system as set forth in claim 5, wherein said light source (12) is configured to generate light in a near-infrared region of an electromagnetic spectrum, optionally wherein said light detector (14) is configured to receive light in the near-infrared region of the electromagnetic spectrum.

12. A system as set forth in claim 5, wherein said sensor (10) includes a printed circuit board (28) having traces configured to minimize a field effect created by said traces (30), and wherein said light source (12) and said light detector (14) are disposed on said printed circuit board (28).

13. A system as set forth in claim 5, further comprising an electronic device (46) in proximity with said sensor (10), wherein capacitively isolating said sensor (10) from the patient (44) reduces interference caused by said electronic device (46).

Patentansprüche

1. Sensor (10), umfassend:

   eine Lichtquelle (12);
   einen Lichtdetektor (14) in optischer Kommunikation mit der Lichtquelle (12);
   und
   ein Sensorplättchen (16) mit einer ersten Oberfläche (20) und einer zweiten Oberfläche (22), wobei das Sensorplättchen (16) die Lichtquelle (12) und den Lichtdetektor (14) mindestens teilweise beherbergt;
   dadurch gekennzeichnet, dass die erste Oberfläche (20) mindestens teilweise mit einem leitfähigen Klebstoff überzogen ist und die zweite Oberfläche mindestens teilweise mit einem nicht leitfähigen selbstklebenden Klebstoff (26) überzogen ist, worin eine Dicke des Sensorplättchens (16) dafür konfiguriert ist, das Sensorplättchen kapazitiv von einem Patienten (44) zu isolieren.

2. Sensor (10) nach Anspruch 1, worin die Lichtquelle (12) dafür konfiguriert ist, Licht in einem nahen Infrarotbereich

eines elektromagnetischen Spektrums zu erzeugen, worin der Lichtdetektor (14) optional dafür konfiguriert ist, Licht in dem nahen Infrarotbereich des elektromagnetischen Spektrums zu empfangen.

3. Sensor (10) nach Anspruch 1, ferner eine Leiterplatte (28) umfassend, die Leiterzüge (30) hat, die dafür konfiguriert sind, einen durch die Leiterzüge (30) erzeugten Feldeffekt zu minimieren, und worin die Lichtquelle (12) und der Lichtdetektor (14) auf der Leiterplatte (28) angeordnet sind.

4. Sensor (10) nach Anspruch 1, ferner ein auf dem Sensorplättchen (16) angeordnetes Lichtsperrplättchen (32) umfassend, optional ferner einen zwischen dem Sensorplättchen (16) und dem Lichtsperrplättchen (32) angeordneten Abstandhalter (34) umfassend.

5. Physiologisches Sensorsystem, umfassend: einen Sensor (10) nach einem der vorhergehenden Ansprüche; und einen Verstärker (48) in Kommunikation mit dem Sensor (10), wobei der Verstärker (48) eine Signalmasse (50) und einen Monitor (52) einschließt, worin der Sensor (10) dafür konfiguriert ist, von einem Patienten kapazitiv isoliert zu werden, und zwar mindestens teilweise auf der Grundlage einer Dicke des Sensorplättchens.

6. System nach Anspruch 5, worin der Sensor (10) eine Leiterplatte (28) einschließt und der leitfähige Klebstoff über einen freiliegenden Bereich der Leiterplatte (28) mit der Signalmasse (50) in Kommunikation steht.

7. System nach Anspruch 5, worin die Signalmasse (50) von dem Monitor (52) kapazitiv isoliert ist.

8. System nach Anspruch 7, worin die Kapazität zwischen der Signalmasse (50) und dem Monitor (52) 0,1 pF bis 1,0 pF beträgt.

9. System nach Anspruch 5, worin das Sensorplättchen so eingerichtet ist, dass in Verwendung eine Kapazität zwischen dem Sensorplättchen (16) und dem Patienten (44) größer als eine Kapazität zwischen der Signalmasse (50) und dem Monitor (52) ist.

10. System nach Anspruch 9, worin die Kapazität zwischen dem Sensorplättchen (16) und dem Patienten (44) und die Kapazität zwischen der Signalmasse (50) und dem Monitor (52) einen Spannungsteiler bilden, der ein elektrisches Potenzial zwischen dem Patienten (44) und der Lichtquelle (12) vermindert.

11. System nach Anspruch 5, worin die Lichtquelle (12) dafür konfiguriert ist, Licht in einem nahen Infrarotbereich eines elektromagnetischen Spektrums zu erzeugen, worin der Lichtdetektor (14) optional dafür konfiguriert ist, Licht in dem nahen Infrarotbereich des elektromagnetischen Spektrums zu empfangen.

12. System nach Anspruch 5, worin der Sensor (10) eine Leiterplatte (28) umfasst, die Leiterzüge hat, die dafür konfiguriert sind, einen durch die Leiterzüge (30) erzeugten Feldeffekt zu minimieren, und worin die Lichtquelle (12) und der Lichtdetektor (14) auf der Leiterplatte (28) angeordnet sind.

13. System nach Anspruch 5, ferner ein elektronisches Gerät (46) in der Nähe des Sensors (10) umfassend, worin die kapazitive Isolierung des Sensors (10) von dem Patienten (44) eine durch das elektronische Gerät (46) verursachte Störung verringert.

Revendications

1. Capteur (10) comprenant:

une source de lumière (12) ;
un détecteur de lumière (14) en communication optique avec ladite source de lumière (12); et
une pastille de capteur (16) comportant une première surface (20) et une deuxième surface (22) et la pastille de capteur (16) logeant au moins partiellement ladite source de lumière (12) et ledit détecteur de lumière (14), **caractérisé en ce que** la première surface (20) est au moins partiellement revêtue d'un adhésif conducteur, et la deuxième surface est au moins partiellement revêtue d'un adhésif autocollant non conducteur (26), dans lequel une épaisseur de ladite pastille de capteur (16) est configurée pour isoler capacitivement la pastille de capteur d'un patient (44).

2. Capteur (10) selon la revendication 1, dans lequel ladite source de lumière (12) est configurée pour générer une lumière dans une région proche infrarouge d'un spectre électromagnétique, dans lequel ledit détecteur de lumière (14) est optionnellement configuré pour recevoir une lumière dans la région proche infrarouge du spectre électromagnétique.

3. Capteur (10) selon la revendication 1, comprenant en outre une carte de circuit imprimé (28) comportant des pistes (30) configurées pour réduire à un minimum un effet de champ créé par lesdites pistes (30), et dans lequel ladite source de lumière (12) et ledit détecteur de lumière (14) sont disposés sur ladite carte de circuit imprimé (28).

4. Capteur (10) selon la revendication 1, comprenant en outre une pastille de blocage de lumière (32) disposée sur la pastille de capteur (16), comprenant en outre optionnellement un élément d'espacement (34) disposé entre ladite pastille de capteur (16) et ladite pastille de blocage de lumière (32).

5. Système de capteur physiologique comprenant : un capteur (10) selon l'une quelconque des revendications précédentes ; et un amplificateur (48) en communication avec ledit capteur (10), ledit amplificateur (48) comprenant une masse de signal (50) et un moniteur (52), dans lequel ledit capteur (10) est configuré pour être isolé capacitivement d'un patient au moins en partie sur la base d'une épaisseur de ladite pastille de capteur.

6. Système selon la revendication 5, dans lequel ledit capteur (10) comprend une carte de circuit imprimé (28) et ledit adhésif conducteur est en communication avec ladite masse de signal (50) par l'intermédiaire d'une zone exposée de ladite carte de circuit imprimé (28).

7. Système selon la revendication 5, dans lequel ladite masse de signal (50) est isolée capacitivement dudit moniteur (52).

8. Système selon la revendication 7, dans lequel la capacitance entre ladite masse de signal (50) et ledit moniteur (52) est de 0,1 pF à 1,0 pF.

9. Système selon la revendication 5, dans lequel la pastille de capteur est conçue de sorte que, en utilisation, une capacitance entre ladite pastille de capteur (16) et le patient (44) soit supérieure à une capacitance entre ladite masse de signal (50) et ledit moniteur (52).

10. Système selon la revendication 9, dans lequel la capacitance entre ladite pastille de capteur (16) et le patient (44) et la capacitance entre ladite masse de signal (50) et ledit moniteur (52) créent un diviseur de tension qui diminue un potentiel électrique entre le patient (44) et la source de lumière (12).

11. Système selon la revendication 5, dans lequel ladite source de lumière (12) est configurée pour générer une lumière dans une région proche infrarouge d'un spectre électromagnétique, dans lequel ledit détecteur de lumière (14) est optionnellement configuré pour recevoir une lumière dans la région proche infrarouge du spectre électromagnétique.

12. Système selon la revendication 5, dans lequel ledit capteur (10) comprend une carte de circuit imprimé (28) comportant des pistes configurées pour réduire à un minimum un effet de champ créé par lesdites pistes (30), et dans lequel ladite source de lumière (12) et ledit détecteur de lumière (14) sont disposés sur ladite carte de circuit imprimé (28).

13. Système selon la revendication 5, comprenant en outre un dispositif électronique (46) à proximité dudit capteur (10), dans lequel l'isolement capacitif dudit capteur (10) du patient (44) réduit une interférence provoquée par ledit dispositif électronique (46).

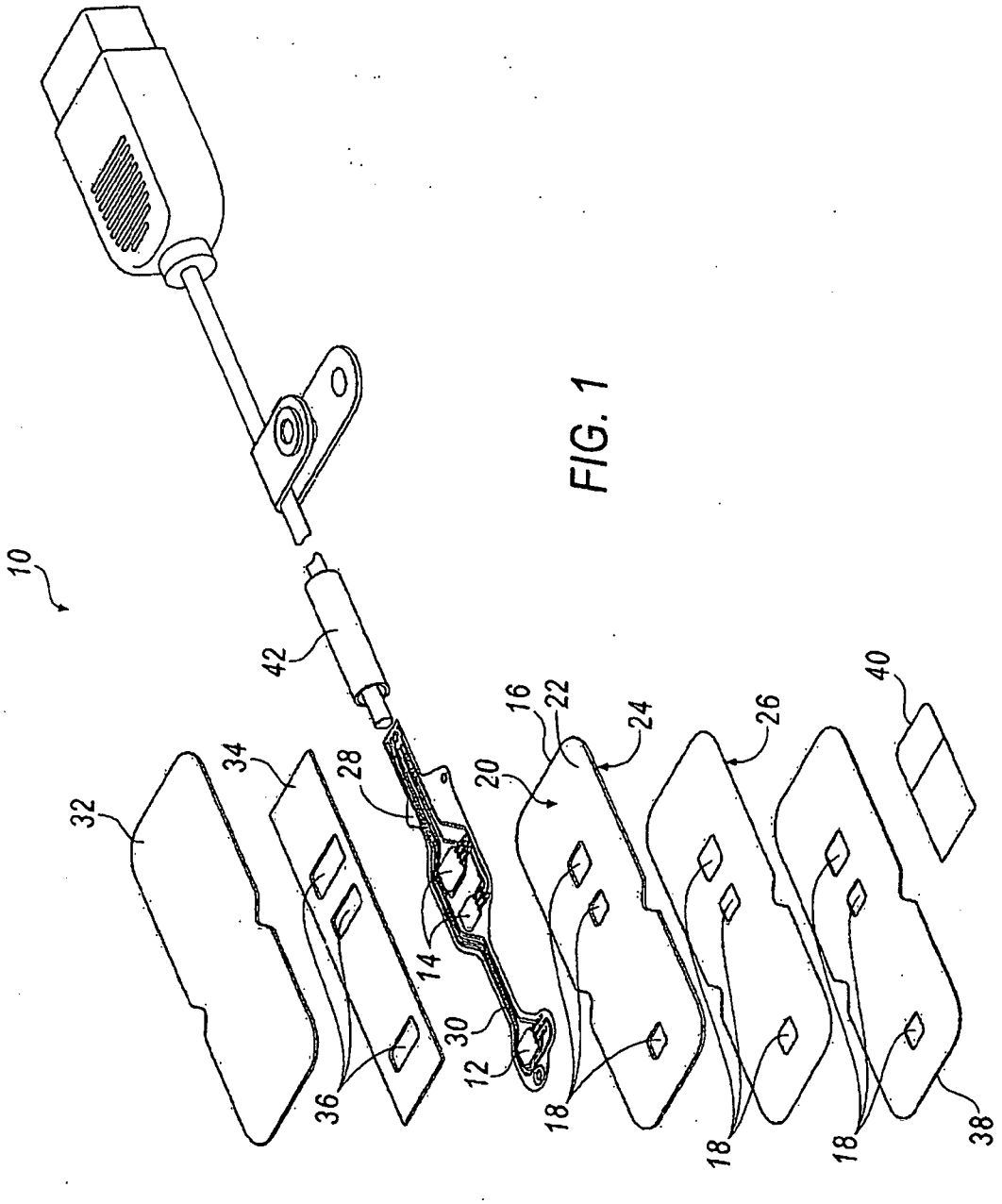

FIG. 1

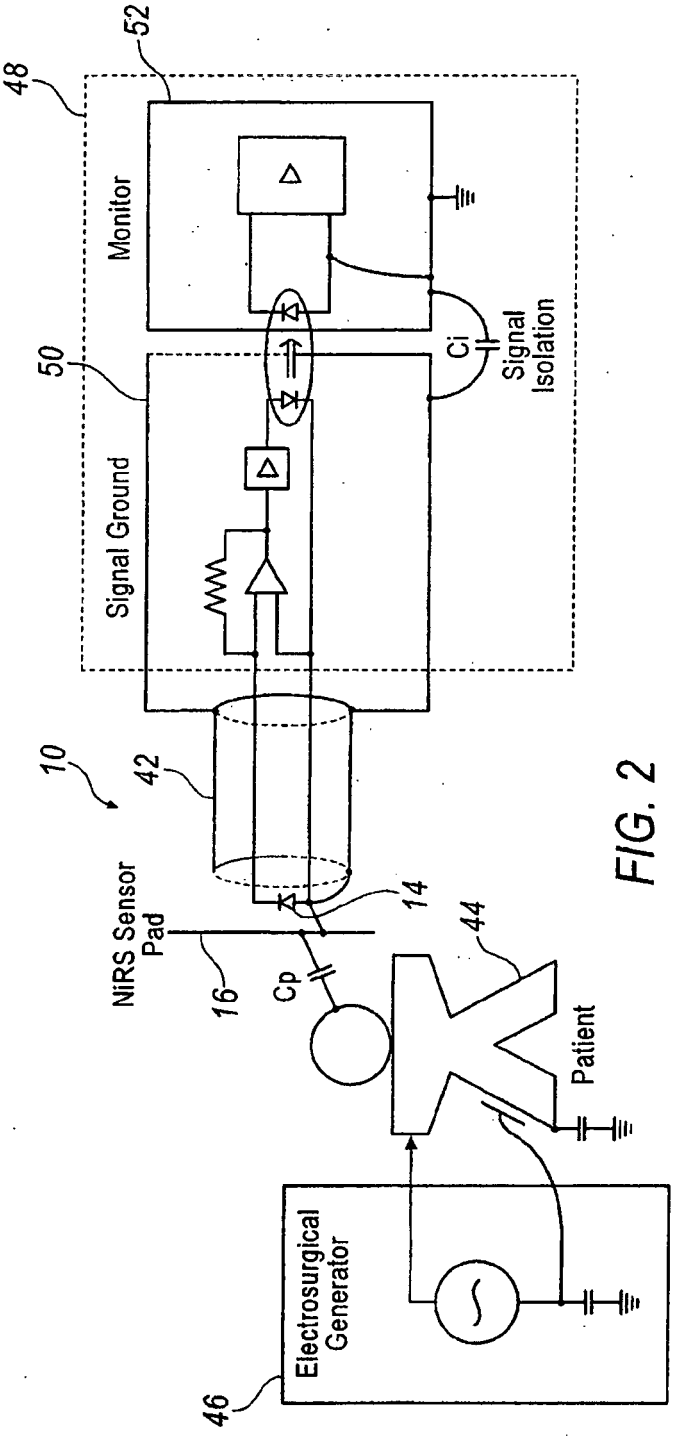
48
52
Monitor
50
Signal Ground
Ci
Signal Isolation
10
42
14
NiRS Sensor Pad
16
Cp
44
Patient
Electrosurgical Generator
46

FIG. 2

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20080015424 A **[0002]**

专利名称(译)	生理传感器对干扰的敏感性降低		
公开(公告)号	EP2434942B1	公开(公告)日	2014-09-03
申请号	EP2010719214	申请日	2010-05-14
申请(专利权)人(译)	SOMANETICS CORPORATION		
当前申请(专利权)人(译)	COVIDIEN LP		
[标]发明人	GONOPOLSKIY OLEG ANDERSON ARIK		
发明人	GONOPOLSKIY, OLEG ANDERSON, ARIK		
IPC分类号	A61B5/00		
CPC分类号	A61B5/7217 A61B5/14552 A61B5/68335 A61B2562/182		
优先权	12/471716 2009-05-26 US		
其他公开文献	EP2434942A1		
外部链接	Espacenet		

摘要(译)

具有降低的干扰敏感度的生理传感器包括光源，与光源光学连通的光检测器，以及至少部分地容纳光源和光检测器的传感器垫。传感器垫被配置为与患者电容性隔离。此外，生理传感器可以电连接到具有信号地和放大器的放大器。