Description

This invention relates to medical sensors for detecting physiological functions and, in particular, to an optical sensor for detecting vascular flow in a pulse oximetry system.

Pulse oximetry is a non-invasive medical technique useful for measuring certain vascular conditions. In practice of the technique, light is passed through a portion of a patient's body which contains arterial blood flow. An optical sensor is used to detect the light which has passed through the body, and variations in the detected light at various wavelengths are then used to determine arterial oxygen saturation and/or pulse rates. Oxygen saturation may be calculated using some form of the classical absorption equation known as Beer's Law.

Accurate measurements of these physiological functions are predicated upon optical sensing in the presence of arterial blood flow. Conveniently a finger may serve this purpose, which allows easy access to a body part through which light will readily pass. Local vascular flow in a finger is dependent upon several factors which affect the supply of blood. Blood flow may be affected by centrally mediated vasoconstriction, which must be alleviated by managing the perceived central causes. Peripheral constriction, however, can be induced by local causes. One such cause of local vasoconstriction is low ambient temperature, which is a particular problem for body extremities such as the finger. Low temperature induced vasoconstriction and the resultant decrease in blood supply can strongly affect the sensor's ability to detect the desired signal. Conventional attempts to alleviate the problem of low temperature vasoconstriction include the use of an integral heater to the sensor and periodic massaging. Heaters must be well regulated to avoid overheating, increase the complexity of the sensor, and can be costly. Periodic massaging can be effective, but usually requires removal of the sensor while the sensor locality is massaged. After some massaging of the locality to stimulate blood flow to it, the sensor is reapplied and measurement resumed. It would be desirable to employ a less complex, passive means for retaining body heat which does not interrupt the measurement process.

In sensors which detect light transmitted through a portion of the body, ambient light sources may interfere with the signal being observed. Because skin tissue is translucent, outside light is easily scattered and transmitted within the tissue toward the optical detector of the sensor. It is desirable to shield the detector from ambient light for a distance of approximately 12mm (one-half inch) around the detector area. A combination of the use of an opaque material and an effective sensor design will contribute significantly to the prevention of ambient light interference.

The present invention is defined in the claims.

A wrap having the precharacterising features of claim 1 is described in EP-A-0 127 947.

In accordance with the principles of one embodiment of the present invention, a pulse oximeter sensor is provided which reduces signal loss due to thermal vasoconstriction and ambient light interference. The sensor includes a light emitting diode (LED) light source and a photodiode for detecting light from the source. The LED and the photodiode are spaced apart on the body-facing side of a sensor wrap which secures the LED and photodiode on the body. The sensor wrap comprises a metallized film which is laminated to a backing material. The metallized layer is thermally reflective so as to reflect body heat back to the body, and is opaque so as to shield the photodiode from ambient light. The metallized layer may also be grounded to shield the sensor's electrical components from electromagnetic interference. The backing material may comprise insulating material such as foam to provide additional comfort and compliance of the wrap. Means are provided for securing the sensor wrap around a body part such as a finger.

In the drawings:

FIGURES 1a-1c illustrate plan and cross-sectional views of a sensor constructed in accordance with the principles of the present invention;

FIGURES 2a-2c illustrate plan and cross-sectional views of a second embodiment of the present invention;

FIGURES 3-6 illustrate use of the sensor of FIGURES 1a-1c; and

FIGURES 7-11 illustrate use of the sensor of FIGURES 2a-2c.

Referring to FIGURES 1a-1c, an oximeter sensor wrap constructed in accordance with the principles of the present invention is shown. FIGURE 1a is a plan view of the outside of a finger wrap, with the outer surface 12 comprising a sheet of soft, compliant polyvinylchloride (PVC) film material. The wrap has a length (from top to bottom in the drawing) of approximately 114.3mm (about 4 1/2 inches), and a width (across the top) which varies from approximately 76.2 to 99.1 mm (about 3 to 3.9 inches), depending upon the finger size for which the wrap is designed. On the right inner surface of the wrap is a means 14 for securing the wrap about the finger of a patient. This means may be an area of contact adhesive, but in the illustrated embodiment of FIGURE 1a the securing means comprises a patch of tricot loop material which is adhesively laminated to the PVC sheet. A suitable tricot loop material is type SJ3491, avail-

able from Minnesota Mining and Manufacturing Company of St. Paul Minnesota, which is affixed with 3M type Y9485 adhesive laminate.

A second securing means 16 is located along the center of the lower extension of the wrap. This securing means 16 may also be a contact adhesive, but in the illustrated embodiment the means 16 comprises a strip of 3M Scotchmate hook material type SJ 3526 which is adhesively laminated to the wrap. The hook material is designed to mate with the tricot loop material in a secure but releasable engagement as discussed below in conjunction with FIGURES 3-6. The hook and loop securing means is preferred over adhesive securing means because it permits repeated use of the wrap.

The inner, or finger facing side of the wrap is shown in FIGURE 1b. The inner surface 18 of the wrap comprises a sheet of metallized polyester film material, which is described more fully below. Securing means 20 and 22 are located on the inner surface 18 and may comprise contact adhesive. Preferably, the means 20 comprises a patch of the tricot loop material described above, and the means 22 comprises a patch of the hook material. Running along the stem of the T-shaped wrap and extending upward to approximately the center of the top of the "T" is an area 24 of the type Y9485 adhesive. A cross-hatched ink pattern 28 is printed beneath the adhesive and is visible through the adhesive. This pattern indicates to the user the area in which the LED strip of the sensor is to be placed, as discussed below. To protect the adhesive area 24 from unintended adhesion and contamination prior to use, the adhesive area 24 is covered with a release strip 26 of silicone coated kraft paper.

Referring to FIGURE 1c, a cross-sectional view of the layers comprising the wrap of FIGURES 1a and 1b is shown. The PVC layer 12 which comprises the outer surface of the wrap has a thickness of approximately 33µm (13 mils), and the PVC film is reinforced with polyester fibers. This compliant layer 12 is fairly opaque to shade the photodiode in the LED strip from ambient light. The release strip 26 is shown covering the adhesive area 24, which overlies the cross-hatched ink pattern 28. In accordance with the principles of the present invention the inner surface of the wrap comprises a layer 18 of 2.5µm (1 mil) aluminum metallized polyester film. The metallized film is available from Tapemark Co. of W St. Paul, Minnesota. The resistance of the metallization corresponds directly to the thickness of the metallization on the film and in the illustrated embodiment the metallization has a resistance of less than two ohms per square. This metallization provides the film with an opacity of better than 95%. The metallized surface of the film has a soft matte finish which is non-glaring. The metallized film layer 18 is laminated to the PVC layer 12 with the type Y9485 adhesive as shown by adhesive layer 32. The metallized film provides the sensor with the desired degree of protection from ambient light interference, as well as high thermal protection for the finger. It has been found that approximately 70-80% of body heat loss is through radiation. The metallized inner surface of the wrap is effective for reflecting a substantial portion of this radiated heat back to the finger, thereby aiding in the reduction of thermal vasoconstriction. The combined opacity and reflective properties of the metallized layer help maintain the conditons needed for good signal reception by the sensor.

If desired, the metallized layer may be electrically grounded to a connection from the LED strip to help shield the electronic components in the LED strip from electromagnetic interference.

In use, the release strip 26 is peeled away to uncover the adhesive area 24 for the LED strip. The LED strip 30 is then affixed to the adhesive area as shown in FIGURE 3. The LED strip 30 is made of a rubber-like material of a medical grade, such as silicone rubber, polyurethane, or PVC. The upper surface of the strip 30 has a window for LED's 34 and a second window for a photodiode 36. Between the two is a shallow depression 38 which allows the LED strip 30 to be folded over the fingertip. Wiring inside the strip 30 connects the LEDS and photodiode to a cable at the end of the strip, either through discrete wires or flexible printed wiring. The rubber-like LED strip may be molded around the electronic components, or may be formed in two halves which are then laminated together. The rubber-like strip is waterproof so that the strip may be washed between uses.

After the fingertip is placed on the photodiode 36 as shown in FIGURE 3, the stem of the T-shaped wrap with the attached LED strip is folded over the top of the finger as shown in FIGURE 4. Then the left side of the wrap is folded over the stem of the "T" so that the tricot loop patch 20 is secured to the hook material 16. This step is shown in FIGURE 5. Finally, the right side of the wrap is folded over the finger so that the patch 22 of hook material fastens to the tricot loop patch 14, as shown in FIGURE 6. The sensor is thus securely wrapped around the finger, with the finger surrounded by the metallized film layer 18.

After the measurement process is finished, the sensor is unwrapped and the LED strip may be removed from the adhesive area 24 for washing and reuse in another procedure. The hook and loop securing means permit the sensor to be easily unwrapped and resecured if it is desirable to do so during a measurement procedure.

Referring to FIGURES 2a-2c, a disposable wrap for an oximeter sensor is shown. FIGURE 2a shows the outer surface of the wrap, which comprises a layer 40 of 2.5µm (1 mil) metallized polyester film. The wrap is approximately 127mm (about 5 inches) long and 50.8mm (about 2 inches) wide, and is narrowed in the central region where the wrap folds around the fingertip. Located on the back, or finger-facing side of the wrap is a sheet of release paper 42, shown in the back view of FIGURE 2b. The back of the wrap comprises a sheet 44 of medical grade foam, which is coated with Semex type TT4025 adhesive. The release paper 42 covers the adhesive surface prior to use. A central longitudinal region 46 of the release paper is perforated, allowing this region of the wrap to be uncovered first. The LED strip 30 is then affixed to this initially uncovered adhesive region. Once the LED strip is attached to the wrap, the remaining release paper is peeled away to enable the sensor to be secured to a finger.

A cross-sectional view of the wrap of FIGURES 2a and 2b is shown in FIGURE 2c. The release paper 42 is seen overlying the adhesive coating 49 on the foam layer 44. The preferred foam layer is approximately 30 mils thick, and is available from Semex Medical Company of Malvern, Pennsylvania as type KM-1422. The foam layer 44 is conformable to the finger of the patient and provides a degree of comfort during use. The matte finished aluminum metallized polyester film layer 40 is laminated to the foam layer by an adhesive 47.

In the FIGURE 2a-2c embodiment, the use of the metallized film as the outer layer provides the same opacity and heat reflective properties as the embodiment of FIGURES 1a-1c. If desired, the foam and metallized film layers could be exchanged so that the metallized film layers directly opposes the finger and the foam is on the outside.

Use of the wrap of FIGURES 2a-2c is depicted in FIGURES 7-11. In FIGURE 7 the LED strip 30 is shown affixed to the central longitudinal region of the wrap after the center strip 46 of the release paper has been removed. The remaining release paper is then peeled away as shown in FIGURE 7. Nest, the fingertip is placed over the photodiode 36, as shown in FIGURE 8. The wrap and LED strip are folded over the fingertip as shown in FIGURE 9. The areas of the wrap on either side of the LED strip are folded down about the finger as shown in FIGURE 10. Finally, the lower sides of the wrap are folded up over the outer surface of the wrap, as shown in FIGURE 11, so that the adhesive coating 49 seals the overwrapped sides together. Removal of the sensor will generally impair the adhesive or tear the foam, so the wrap is then removed from the LED strip and disposed of when the measurement procedure is complete.

Claims

1. A wrap for use in a system for sensing light absorption through transillumination of blood perfused flesh by a light source (34) and reception of light by a light sensor (36), the wrap serving to secure said light source (34) and sensor (36) in optical contact with a patient, characterised in that the wrap comprises a compliant sheet (12, 18; 40) of metallized material which is capable of reflecting body heat and is highly opaque, and means (14, 20, 22; 49) for securing said sheet to the body of a patient.

2. A wrap according to claim 1, further comprising means (24, 46) for securing said light source and said light sensor to said wrap.

3. A wrap according to claim 1 or 2, wherein said wrap comprises an inner, body-facing layer (18) of said sheet of metallized material, and an outer layer (12) of fabric.

4. A wrap according to claim 3, wherein said outer fabric layer (12) comprises a layer of polyvinylchloride laminated to said sheet of metallized material.

5. A wrap according to claim 4, wherein said means for securing the sheet to the body of a patient comprises pieces (14, 16, 20, 22) of hook material and loop material for mating with each other to secure the sheet in a wrapped condition.

6. A wrap according to claim 1 or 2, wherein said wrap comprises an inner, body-facing layer of foam (44), and an outer layer (40) comprising said sheet of metallized material.

7. A wrap according to claim 6, wherein said foam layer (44) is laminated to said metallized material (40).

8. A wrap according to claim 7, wherein said means for securing the sheet to the body (49) comprises pressure sensitive adhesive.

9. A wrap according to claim 8, wherein said pressure sensitive adhesive is covered with release paper (42) prior to use.

10. A wrap according to any preceding claim, wherein said sheet (18; 40) of metallized material comprises aluminum metallized polyester film.

Referring to FIGURES 2a-2c, a disposable wrap for an oximeter sensor is shown. FIGURE 2a shows the outer surface of the wrap, which comprises a layer 40 of 2.5µm (1 mil) metallized polyester film. The wrap is approximately 127mm (about 5 inches) long and 50.8mm (about 2 inches) wide, and is narrowed in the central region where the wrap folds around the fingertip. Located on the back, or finger-facing side of the wrap is a sheet of release paper 42, shown in the back view of FIGURE 2b. The back of the wrap comprises a sheet 44 of medical grade foam, which is coated with Semex type TT4025 adhesive. The release paper 42 covers the adhesive surface prior to use. A central longitudinal region 46 of the release paper is perforated, allowing this region of the wrap to be uncovered first. The LED strip 30 is then affixed to this initially uncovered adhesive region. Once the LED strip is attached to the wrap, the remaining release paper is peeled away to enable the sensor to be secured to a finger.

A cross-sectional view of the wrap of FIGURES 2a and 2b is shown in FIGURE 2c. The release paper 42 is seen overlying the adhesive coating 49 on the foam layer 44. The preferred foam layer is approximately 30 mils thick, and is available from Semex Medical Company of Malvern, Pennsylvania as type KM-1422. The foam layer 44 is conformable to the finger of the patient and provides a degree of comfort during use. The matte finished aluminum metallized polyester film layer 40 is laminated to the foam layer by an adhesive 47.

In the FIGURE 2a-2c embodiment, the use of the metallized film as the outer layer provides the same opacity and heat reflective properties as the embodiment of FIGURES 1a-1c. If desired, the foam and metallized film layers could be exchanged so that the metallized film layers directly opposes the finger and the foam is on the outside.

Use of the wrap of FIGURES 2a-2c is depicted in FIGURES 7-11. In FIGURE 7 the LED strip 30 is shown affixed to the central longitudinal region of the wrap after the center strip 46 of the release paper has been removed. The remaining release paper is then peeled away as shown in FIGURE 7. Nest, the fingertip is placed over the photodiode 36, as shown in FIGURE 8. The wrap and LED strip are folded over the fingertip as shown in FIGURE 9. The areas of the wrap on either side of the LED strip are folded down about the finger as shown in FIGURE 10. Finally, the lower sides of the wrap are folded up over the outer surface of the wrap, as shown in FIGURE 11, so that the adhesive coating 49 seals the overwrapped sides together. Removal of the sensor will generally impair the adhesive or tear the foam, so the wrap is then removed from the LED strip and disposed of when the measurement procedure is complete.

Claims

1. A wrap for use in a system for sensing light absorption through transillumination of blood perfused flesh by a light source (34) and reception of light by a light sensor (36), the wrap serving to secure said light source (34) and sensor (36) in optical contact with a patient, characterised in that the wrap comprises a compliant sheet (12, 18; 40) of metallized material which is capable of reflecting body heat and is highly opaque, and means (14, 20, 22; 49) for securing said sheet to the body of a patient.

2. A wrap according to claim 1, further comprising means (24, 46) for securing said light source and said light sensor to said wrap.

3. A wrap according to claim 1 or 2, wherein said wrap comprises an inner, body-facing layer (18) of said sheet of metallized material, and an outer layer (12) of fabric.

4. A wrap according to claim 3, wherein said outer fabric layer (12) comprises a layer of polyvinylchloride laminated to said sheet of metallized material.

5. A wrap according to claim 4, wherein said means for securing the sheet to the body of a patient comprises pieces (14, 16, 20, 22) of hook material and loop material for mating with each other to secure the sheet in a wrapped condition.

6. A wrap according to claim 1 or 2, wherein said wrap comprises an inner, body-facing layer of foam (44), and an outer layer (40) comprising said sheet of metallized material.

7. A wrap according to claim 6, wherein said foam layer (44) is laminated to said metallized material (40).

8. A wrap according to claim 7, wherein said means for securing the sheet to the body (49) comprises pressure sensitive adhesive.

9. A wrap according to claim 8, wherein said pressure sensitive adhesive is covered with release paper (42) prior to use.

10. A wrap according to any preceding claim, wherein said sheet (18; 40) of metallized material comprises aluminum metallized polyester film.

11. A wrap according to claim 1, wherein the wrap comprises a generally T-shaped sheet (12) of material, the stem of the "T" including means for affixing said light source and sensor to said wrap, said securing means (14, 20, 22) being disposed laterally on the top of the "T" for securing the top of the "T" in a folded condition around a finger, and wherein electrical connections to said light source and light sensor extend in a direction generally parallel to the longitudinal axis of a finger when the wrap is secured to the finger.

12. A wrap according to claim 11, further comprising means (16), located on the stem of the "T", for securing the stem of the "T" in a folded condition to the top of the "T".

13. A wrap according to claim 11 or 12, wherein said affixing means (24) comprises an adhesive area.

14. A wrap according to claim 13, wherein said means for securing the sheet to the body (14, 20, 22, 16) comprise mating pieces of hook material and loop material.

15. A wrap according to claim 1, wherein the wrap comprises an elongated sheet (40) of material having a longitudinal dimension and a lateral dimension across which said wrap is folded during use, said securing means (49) comprising an adhesive coated on a finger contacting surface of said sheet, and said wrap further comprising means (42) for protecting said adhesive from unintended adhesion prior to use, said finger contacting surface including a longitudinal region for attaching said light source and sensor and their electrical connections in alignment with the longitudinal dimension of said sheet of material.

16. A wrap according to claim 15, wherein said protecting means includes means (46) for uncovering said longitudinal region prior to uncovering the remainder of said finger contacting surface.

17. A wrap according to claim 16, wherein said protecting means (42) comprises a sheet of perforated release paper (46), perforated about the area of said longitudinal region.

18. A wrap according to claim 15, wherein the lateral dimension of said sheet of material is narrowed in the region across which said wrap is to be folded during use.

Patentansprüche

1. Eine Umhüllung zur Verwendung in einem System zur Erfassung der Lichtabsorption mittels Durchleuchtung von blutdurchströmtem Fleisch mittels einer Lichtquelle (34) und Empfang von Licht mittels eines Lichtsensors (36), wobei die Umhüllung dazu dient, die Lichtquelle (34) und den Sensor (36) in optischem Kontakt mit einem Patienten zu befestigen,
dadurch gekennzeichnet, daß
die Umhüllung eine nachgiebige Lage (12, 18; 40) eines metallisierten Materials aufweist, das fähig ist, Körperwärme zu reflektieren und hochgradig lichtundurchlässig ist, und daß eine Einrichtung (14, 20, 22; 49) zur Befestigung der Lage am Körper eines Patienten vorgesehen ist.

2. Umhüllung nach Anspruch 1, weiterhin aufweisend eine Einrichtung (24, 46) zur Befestigung der Lichtquelle und des Lichtsensors an der Umhüllung.

3. Umhüllung nach Anspruch 1 oder 2, bei der die Umhüllung eine innere, dem Körper zugewandte Schicht (18) der Lage aus metallisiertem Material und eine äußere Schicht (12) aus Textil aufweist.

4. Umhüllung nach Anspruch 3, bei der die äußere Textilschicht (12) eine Schicht aus Polyvenylchlorid aufweist, die auf die Lage aus metallisiertem Material laminiert ist.

5. Umhüllung nach Anspruch 4, bei der die Einrichtung zur Befestigung der Lage am Körper eines Patienten Teile (14, 16, 20, 22) eines Hakenmaterials und eines Schlingenmaterials aufweist zur Paarung miteinander, um die Lage in einem Umhüllungszustand zu befestigen.

6. Umhüllung nach Anspruch 1 oder 2, bei der die Umhüllung eine innere, dem Körper zugewandte Schicht aus Schaum (44) und eine äußere Schicht (40) aufweist, die die Schicht aus metallisiertem Material aufweist.

7. Umhüllung nach Anspruch 6, bei der die Schaumschicht (44) auf das metallisierte Material (40) laminiert ist.

8. Umhüllung nach Anspruch 7, bei der die Einrichtung zur Befestigung der Lage am Körper (49) ein druckempfindliches Klebemittel aufweist.

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9. Umhüllung nach Anspruch 8, bei der das druckempfindliche Klebemittel mit einem Abziehpapier (42) vor der Verwendung abgedeckt ist.

10. Umhüllung nach einem vorhergehenden Anspruch, bei der die Lage (18; 40) aus metallisiertem Material einen mit Aluminium metallisierten Polyesterfilm aufweist.

11. Umhüllung nach Anspruch 1, bei der die Umhüllung eine insgesamt T-förmige Materiallage (12) aufweist, wobei der Stiel des "T" eine Einrichtung zur Befestigung der Lichtquelle und des Sensors an der Umhüllung umfaßt, wobei die Befestigungseinrichtung (14, 20, 22) seitlich auf dem Oberteil des "T" angeordnet ist zur Befestigung des Oberteils des "T" in einem um einen Finger herum gefalteten Zustand, und bei der sich elektrische Verbindungen zur Lichtquelle und zum Lichtsensor in einer Richtung erstrecken, die im wesentlichen parallel zur Längsachse eines Fingers ist, wenn die Umhüllung am Finger befestigt ist.

12. Umhüllung nach Anspruch 11, weiterhin aufweisend eine Einrichtung (16), die auf dem Stiel des "T" angeordnet ist, zur Befestigung des Stiels des "T" in einem gefalteten Zustand an dem Oberteil des "T".

13. Umhüllung nach Anspruch 11 oder 12, bei der die Befestigungseinrichtung (24) eine Klebefläche aufweist.

14. Umhüllung nach Anspruch 13, bei der die Einrichtung zur Befestigung der Lage am Körper (14, 20, 22, 16) zueinander passende Teile von Hakenmaterial und Schlingenmaterial aufweist.

15. Umhüllung nach Anspruch 1, bei der die Umhüllung eine längliche Lage (40) aus einem Material aufweist, das eine Längsausdehnung und eine Querausdehnung aufweist, über welche die Umhüllung während des Gebrauchs gefaltet ist, wobei die Befestigungseinrichtung (49) ein Klebemittel aufweist, das auf eine Fingerkontaktfläche der Lage beschichtet ist, und die Umhüllung weiterhin aufweist eine Einrichtung (42) zum Schutz des Klebemittels vor einer unbeabsichtigten Klebung vor dem Gebrauch, wobei die Fingerkontaktfläche einen Längsbereich umfaßt zur Befestigung der Lichtquelle und des Sensors und ihrer elektrischen Verbindungen ausgerichtet mit der Längsausdehnung der Materiallage.

16. Umhüllung nach Anspruch 15, bei der die Schutzeinrichtung eine Einrichtung (46) zum Aufdecken des Längsbereichs vor dem Aufdecken des Rests der Fingerkontaktfläche umfaßt.

17. Umhüllung nach Anspruch 16, bei der die Schutzeinrichtung (42) eine Lage aus perforiertem Abziehpapier (46) aufweist, das um die Fläche des Längsbereichs perforiert ist.

18. Umhüllung nach Anspruch 15, bei der die Querausdehnung der Materiallage im Bereich, über den die Umhüllung während des Gebrauchs gefaltet werden muß, verengt ist.

Revendications

1. Enveloppe destinée à être utilisée dans un système de détection de l'absorption de lumière par transillumination de chair irriguée de sang par une source de lumière (34) et réception de lumière par un détecteur de lumière (36), l'enveloppe servant à maintenir ladite source de lumière (34) et ledit détecteur de lumière (36) en contact optique avec un patient, caractérisée en ce que l'enveloppe comprend une feuille souple (12, 18; 40) de matériau métallisé, qui est capable de réfléchir la chaleur corporelle et qui est très opaque, et des moyens (14, 20, 22; 49) destinés à fixer ladite feuille au corps d'un patient.

2. Enveloppe selon la revendication 1, comprenant également des moyens (24, 46) destinés à fixer ladite source de lumière et ledit détecteur de lumière sur ladite enveloppe.

3. Enveloppe selon la revendication 1 ou 2, où ladite enveloppe comprend une couche (18) interne, tournée vers le corps, de ladite feuille de matériau métallisé et une couche externe (12) en tissu.

4. Enveloppe selon la revendication 3, où ladite couche (12) externe de tissu comprend une couche de chlorure de polyvinyle qui est laminée sur ladite feuille de matériau métallisé.

5. Enveloppe selon la revendication 4, où lesdits moyens servant à fixer la feuille sur le corps d'un patient comprennent des parties (14, 16, 22, 22) de matériau à griffes et de matériau à boucles se conjuguant l'une avec l'autre pour fixer la feuille dans un état enveloppé.

6. Enveloppe selon la revendication 1 ou 2, où ladite enveloppe comprend une couche inter-

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ne, tournée vers le corps, de mousse (44) et une couche externe (40) comprenant ladite feuille de matériau métallisé.

7. Enveloppe selon la revendication 6, où ladite couche de mousse (44) est laminée sur ledit matériau métallisé (40).

8. Enveloppe selon la revendication 7, où lesdits moyens (49) de fixation de la feuille sur le corps comprennent un adhésif sensible à la pression.

9. Enveloppe selon la revendication 8, où ledit adhésif sensible à la pression est couvert de papier séparable (42) avant l'utilisation.

10. Enveloppe selon l'une quelconque des revendications précédentes, où ladite feuille (18; 40) de matériau métallisé comprend un film de polyester métallisé à l'aluminium.

11. Enveloppe selon la revendication 1, où l'enveloppe comprend une feuille de matériau, dont la forme générale est celle d'un T, la jambe du "T" comprenant un moyen pour fixer ladite source de lumière et ledit détecteur de lumière sur ladite enveloppe, lesdits moyens de fixation (14, 20, 22) étant disposés latéralement sur le haut du "T" pour fixer le haut du "T" dans un état plié autour d'un doigt, et où les raccordements électriques à ladite source de lumière et audit détecteur de lumière s'étendent dans une direction généralement parallèle à l'axe longitudinal d'un doigt quand l'enveloppe est fixée sur le doigt.

12. Enveloppe selon la revendication 11, comprenant également un moyen (16), situé sur la jambe du "T", pour fixer la jambe du "T", dans un état plié, au sommet du "T".

13. Enveloppe selon la revendication 11 ou 12, où ledit moyen de fixation (24) comprend une zone adhésive.

14. Enveloppe selon la revendication 13, où lesdits moyens de fixation de la feuille sur le corps (14, 20, 22, 16) comprennent des pièces conjuguées de matériau à griffes et de matériau à boucles.

15. Enveloppe selon la revendication 1, où l'enveloppe comprend une feuille allongée (40) de matériau présentant une dimension longitudinale et une dimension latérale en travers de laquelle ladite enveloppe est pliée pendant l'utilisation, ledit moyen de fixation (49) comprenant un adhésif appliqué sur la surface de contact avec le doigt de ladite feuille et ladite enveloppe comprenant également un moyen (42) destiné à protéger ledit adhésif contre une adhésion imprévue avant l'utilisation, ladite surface de contact avec le doigt comprenant une région longitudinale pour fixer ladite source de lumière, ledit détecteur de lumière et leurs raccordements électriques en alignement avec la dimension longitudinale de ladite feuille de matériau.

16. Enveloppe selon la revendication 15, où ledit moyen de protection comprend un moyen (46) pour découvrir ladite région longitudinale avant de découvrir le reste de la surface de contact avec le doigt.

17. Enveloppe selon la revendication 16, où ledit moyen de protection (42) comprend une feuille de papier séparable perforé (46), les perforations couvrant à peu près la zone de ladite région longitudinale.

18. Enveloppe selon la revendication 15, où la dimension latérale de ladite feuille de matériau se rétrécit dans la région en travers de laquelle ladite enveloppe doit être pliée pendant l'utilisation.