track made in a flexible, elastic and conductive material is a goal to connect as many electrodes as been necessary.

The location and quantity of electrodes may modify the garment performance due to track limitations, in order to don't decrease the fabric performance the track must be integrated into the fabric.

In the acquisition of some physiological signals, as the ECG, is important to guaranty the electrode adherence to the body, being integrated in a fabric the electrode doesn't contain any adhesive to attach to the skin. For that purpose reduce the movement of the electrode in activity is extremely necessary to compete to the signal obtain by traditional electrodes.

In a first aspect of the present invention, it is provided a fabric with at least an elastic and electrically conductive area integrated directly into the fabric which comprises a layer of silicone rubber loaded with an electrically conductive material, being the thickness of the elastic and electrically conductive area comprised of from 120 to 800 µm thick. The elastic and electrically conductive area is a track which can be connected to an electrode for acquiring physiological signals, e.g. ECG signals. The electrically conductive area may have any shape and any direction. This opens the possibility to place as many electrodes as been necessary into the fabric, and then connect all the electrodes via the electrically conductive areas to an electrical connector. Each electrically conductive area works like an independently track.

Therefore, according to the present invention, the terms "elastic and electrically conductive area" and "elastic and electrically conductive track" are each interchangeable.

The fabric with an electrically conductive area that comprises a silicone rubber loaded with an electrically conductive material improves the flexibility, the elasticity and the conductivity of the track. The flexibility and the elasticity of the silicone rubber loaded with an electrically conductive material allow that conductivity is not interrupted with the movement of the fabric. Furthermore the silicone doesn't lose its properties with the washing.

CLAIMS

1. A fabric which comprises at least an elastic and electrically conductive track (1) integrated into the fabric, and wherein the elastic and electrically conductive track comprises a silicone rubber loaded with an amount between 5% w/w to 40% w/w of an electrically conductive material, being the thickness of the elastic and electrically conductive track comprised of from 120 to 800 µm thick.

2. The fabric according to claim 1, wherein the thickness of the elastic and electrically conductive track is comprised of from 120 to 500 µm thick.

3. The fabric according to any of the claims 1 to 2, which further comprises a layer of an insulating material covering the track.

4. The fabric according to any of the claims 1 to 3, wherein the fabric comprises an electrode to be placed in contact with the skin of an user, in electrical contact with the elastic and electrically conductive track.

5. The fabric according to claim 4, wherein the electrode comprises a conductive fabric made of conductive fibers and non conductive fibers.

6. The fabric according to claim 4, wherein the electrode comprises a layer of silicone rubber loaded with an amount between 5% w/w to 40% w/w of an elastic and electrically conductive material, which is integrated into the fabric.

7. The fabric according to any of the claims 1 to 6, wherein the electrical resistance per cm of the silicone rubber loaded with an electrically conductive material is comprised of from 50 Ω/cm to 100 kΩ/cm.

8. The fabric according to any of the claims 1 to 7, wherein the cured temperature of the silicone rubber loaded with an electrically conductive material is comprised of from 20°C to 200 °C.

9. The fabric according to any of the claims 1 to 8, wherein the silicone rubber loaded with an amount comprised of from 5% w/w to 40% w/w of a electrically conductive material comprises:

a) diorganopolysiloxane gum having silicon-bonded alkenyl groups;

b) organohydrogenpolysiloxanes;

c) a platinum catalyst; and

d) between 5-40 % w/w of an electrically conductive material.

10. The fabric according to any of the claims 1 to 9, wherein the electrically conductive material is carbon black.

11. A process for the preparation of a fabric as defined in any of the claims 1 to 10, which comprises the steps of:

a) liquid-printing a first layer of silicone rubber loaded with an amount between 5% w/w to 40% w/w of a electrically conductive material into the fabric;

b) pre-curing the first layer for up one minute at a temperature between 80°C to 200°C;

c) curing the first layer at room temperature.

12. The process according to claim 11, wherein the liquid-printing step comprises applying a pressure comprised of from 0.2 to 0.8 Kg/m^2 when printing the silicone rubber loaded with the electrically conductive material directly to the fabric.

13. The process according to claim 12, wherein the liquid-printing step comprises applying a pressure comprised of from 0.3 to 0.5 Kg/m^2 when printing the silicone rubber loaded with the electrically conductive material directly to the fabric.

14. Use of a silicone rubber loaded with an amount comprised of from 5% w/w to 40% w/w of an electrically conductive material for the preparation of the fabric according any of the claims 1 to 10.

15. A device comprising:

a) the fabric as defined in any of the claims 1 to 10,
b) an electronic instrument for receiving and collecting and/or storing and/or processing, and/or transmitting data from said fabric.

16. A garment comprising the device of claim 15.

CLAIMS

1. A fabric comprising at least an elastic and electrically conductive track having a thickness of from 120 µm to 800 µm,

   wherein the elastic and electrically conductive track is integrated directly into the fabric, and

   wherein the elastic and electrically conductive track comprises a silicone rubber loaded with an electrically conductive material.

2. The fabric according to claim 1, wherein the fabric further comprises a layer of an insulating material covering the elastic and electrically conductive track.

3. The fabric according to any one of the claims 1 to 2, wherein the fabric further comprises an electrode, in electrical contact with the elastic and electrically conductive track, the electrode configured to be placed in contact with the skin of a user.

4. The fabric according to claim 3, wherein the electrode comprises a conductive fabric made of conductive fibers and non-conductive fibers.

5. The fabric according to claim 3, wherein the electrode comprises a layer comprising a silicone rubber and an elastic and electrically conductive material in an amount of between 5% w/w to 40% w/w wherein the electrode is integrated into the fabric.

6. The fabric according to any one of the claims 1 to 5, wherein the electrical resistance per cm of the silicone rubber loaded with an electrically conductive material is from 50 Ω/cm to 100 kΩ/cm.

7. The fabric according to any one of the claims 1 to 5, wherein the cured temperature of the silicone rubber loaded with an electrically conductive material is from 20ºC to 200 ºC.

8. The fabric according to any one of the claims 1 to 7, wherein the silicone rubber comprises:
   a) diorganopolysiloxane gum having silicon-bonded alkenyl groups;
   b) organohydrogenpolysiloxanes; and
   c) a platinum catalyst.

9. The fabric according to any one of the claims 1 to 8, wherein the elastic and electrically conductive material is carbon black.

10. A process for the preparation of a fabric as defined in any of the claims 1 to 9, which comprises the steps of:

a) liquid-printing a first layer of silicone rubber loaded with an amount between 5% w/w to 40% w/w of an electrically conductive material into the fabric;

b) pre-curing the first layer for up one minute at a temperature between 80ºC to 200ºC; and

c) curing the first layer at room temperature.

11. The process according to claim 10, wherein the liquid-printing step comprises applying a pressure comprised of from 0.2 Kg/m^2 to 0.8 Kg/m^2 when printing the silicone rubber loaded with the electrically conductive material directly to the fabric.

12. The process according to claim 11, wherein the liquid-printing step comprises applying a pressure comprised of from 0.3 Kg/m^2 to 0.5 Kg/m^2 when printing the silicone rubber loaded with the electrically conductive material directly to the fabric.

13. Use of a silicone rubber loaded with an amount comprised of from 5% w/w to 40% w/w of an electrically conductive material for the preparation of the fabric according any of the claims 1 to 9.

14. A device comprising:

a) the fabric as defined in any of the claims 1 to 9; and

b) an electronic instrument for receiving and collecting and/or storing and/or processing, and/or transmitting data from the fabric.

15. A garment comprising the fabric of any one of the claims 1 to 9 or the device of claim 14.