CLAIMS

1. An electrode patch (400) comprising:

a plurality of signal electrodes (212) configured to contact a subject, each of the plurality of signal electrodes (212) comprising:

a first releasable electrical connector (450) electrically coupled to an electrode (402, 404, 406) and configured to releasably connect to a second releasable electrical connector (452) in electronic communication with an electronics package (500);

a hydrocolloidal layer (412, 414, 416) having a first adhesive layer on a top and a bottom surface thereof, the hydrocolloid layer (412, 414, 416) comprising an opening (419), the electrode (402, 404, 406) disposed within the opening (419), the first adhesive layer configured to adhere the bottom surface of the hydrocolloidal layer (412, 414, 416) to the subject; and

a backer (442, 444, 446) disposed over the opening (419) of the hydrocolloid layer (412, 414, 416) and over at least a portion of the first adhesive layer on the top surface of the hydrocolloid layer (412, 414, 416), the backer (442, 444, 446) comprising an opening (449) to retain the first releasable electrical connector (450);

a protective layer (430) disposed over and surrounding each of the plurality of signal electrodes (212), the protective layer (430) comprising an opening (434) corresponding to each of the plurality of signal electrodes (212), the opening (434) of the protective layer (430) receiving the first releasable electrical connector (450) therethrough, and the protective layer (430) covering and extending beyond the hydrocolloid layer (412, 414, 416) to contain each of the plurality of signal electrodes (212); and

a second adhesive layer disposed on a bottom surface of the protective layer (430), which binds each of the plurality of signal electrodes (212) to the protective layer (430) and binds to the skin of the subject forming a water-resistant seal around the electrode patch (400).

2. The electrode patch (400) of claim 1, wherein the first releasable electrical connector (450) is adhered to the electrode (402, 404, 406); and

a top release liner (439') is disposed over a top surface of the protective layer (430) and is configured to carry the plurality of signal electrodes (212) in a predetermined geometrical arrangement.

3. The electrode patch (400) of claim 1, further comprising a bottom release liner (460) covering a bottom surface of the patch (400), the bottom release liner (460) being removable to expose the first adhesive layer and the second adhesive layer for binding with the skin of the subject.

4. The electrode patch of claim 3,

wherein the first releasable electrical connector (450) comprises a top portion (458) coupled to a bottom portion (456), and the backer (442, 444, 446) is sandwiched between the top portion (458) and the bottom portion (456); and/or

wherein the backer (442, 444, 446) comprises a perforated ethylene-vinyl acetate/polyethylene blend.

5. The electrode patch (400) of claim 1,

wherein the first releasable electrical connector (450) extends through the opening (434) in the protective layer (430); and/or

wherein the protective layer (430) comprises polyurethane with a moisture vapor transmission rate of 300 to 1400 gm/m^2/day.

6. The electrode patch (400) of claim 1, further comprising:

an electronic ground electrode (414) configured to contact the subject adjacent one of the plurality of signal electrodes (212), the electronic ground electrode (414) comprising:

a first releasable ground electrical connector (450) physically and electrically coupled to a ground electrode (408) and configured to releasably connect to a second releasable electrical connector (452) in electrical communication with the electronics package (500), the ground electrode (408) disposed in the opening (419) of the hydrocolloid layer (418);

wherein the protective layer (430) disposed over and surrounding the hydrocolloidal layer (418) comprises an opening (434) corresponding to the releasable ground electrical connector (450), and the second adhesive layer of the protective layer (430) binds the

electronic ground electrode (414) to the protective layer (430) and the skin of the subject surrounding the electronic ground electrode (414).

7. The electrode patch (400) of claim 6, further comprising an isolating barrier (409) disposed between the hydrocolloid layer (418) of the electronic ground electrode (414) and the hydrocolloid layer (416) of the adjacent one of the plurality of signal electrodes (212).

8. A method for obtaining physiological data from a subject, the method comprising:

disposing an adhesive electrode patch (400) on the subject, the adhesive electrode patch (400) adhering to the subject and comprising a first releasable electrical connector (450) electrically coupled to a plurality of signal electrodes (212) of the adhesive electrode patch (400) and configured to releasably connect to a second releasable electrical connector (452);

electrically and physically coupling an electronics package (500) to the adhesive electrode patch (400) by cooperative engagement of the first releasable electrical connector (450) and the second releasable electrical connector (452), the electronics package (500) comprising the second releasable electrical connector (452) electrically coupled to an analog front end circuitry (299) of the electronics package (500), the analog front end circuitry (299) configured to monitor the plurality of signal electrodes (212), each electrically connected to the analog front end circuitry (299) of the electronics package (500) via an active trace (216) to generate corresponding physiological data and to wirelessly transmit the corresponding physiological data to another device; and

equalizing an electronic noise captured by at least one open lead (216A) in connection with the active trace (216), the at least one open lead (216A) having a free end terminating proximal to an another of the plurality of signal electrodes (212).

9. The method of claim 8, wherein the adhesive electrode patch (400) comprises the plurality of signal electrodes (212) held in a predetermined geometrical arrangement by a top release liner (439'), and the method further comprises removing the top release liner (439') after disposing the adhesive electrode patch (400) on the subject and prior to coupling the electronics package (500) to the adhesive electrode patch (400).

10. The method of claim 9, wherein the predetermined geometrical arrangement is a substantially L-shaped arrangement of the plurality of signal electrodes (212), and the analog front end circuitry (299) is configured to obtain electrocardiogram data from the plurality of signal electrodes (212).

11. An electronics package (500) for a wireless physiological sensor system, the electronics package comprising:

a substrate (298);

a first releasable electrical connector (452) connected to the substrate (298) and configured to releasably connect to a second releasable electrical connector (450) disposed on an adhesive electrode patch (400) carrying a plurality of signal electrodes (212);

a first shell (501) disposed on the substrate (298);

a second shell (503) disposed on the substrate (298) spaced apart from the first shell (501); and

electronics configured to monitor the plurality of signal electrodes (212) of the adhesive electrode patch (400) to generate corresponding physiological data and to wirelessly transmit the corresponding physiological data to another device;

wherein the electronics comprises:

a first electronics sub-system disposed in the first shell (501), which comprises a wireless transceiver to wirelessly transmit the corresponding physiological data;

a second electronics sub-system (522) disposed in the second shell (503), which comprises an analog front end circuitry (299) configured to obtain a signal from the plurality of signal electrodes (212) via an active trace (216) and electrically connected to the first releasable electrical connector (452) and an open lead (216A) electrically connected with the active trace (216) proximal to the analog front end circuitry (299) and a free end terminating proximal to another of the plurality of signal electrodes (212); and

a first flexible circuit (550) electrically connecting the first electronics sub-system to the second electronics sub-system (522).

12. The electronics package (500) of claim 11,

wherein the substrate (298) is flexible; and/or

wherein the second electronics sub-system (522) is flexibly connected to the first releasable electrical connector (452).

13. The electronics package (500) of claim 11,

wherein a length of the first flexible circuit (550) between the first shell (501) and the second shell (503) is substantially greater than a corresponding distance between the first shell (501) and the second shell (503) to accommodate stretching or flexing of the substrate (298); and/or

wherein at least a portion of the first shell (501) and at least a portion of the first releasable electrical connector (452) are disposed in the substrate (298).

14. The electronics package (500) of claim 11, wherein the plurality of signal electrodes (212) comprises at least three signal electrodes (212) arranged in a substantially L-shaped structure, and the electronics package further comprises:

a third shell (502) disposed on the substrate (298);

a third electronics sub-system (522) disposed in the third shell (502), which comprises a microprocessing unit, a memory and a program code stored in the memory and executable by the microprocessing unit to control operations of the electronics package;

a second flexible circuit (550) electrically connecting the third electronics sub-system (522) to the second electronics sub-system (522);

wherein the first shell (501), second shell (503) and third shell (502) are arranged in a substantially L-shaped configuration on the substrate (298) corresponding to a disposition of each of the at least three signal electrodes (212), and the first shell (501) and the second shell (503) are disposed at opposed ends of the L-shaped structure.

15. The electronics package (500) of claim 14, wherein:

the first flexible circuit (550) comprises:

a first active trace (216) extending between the first shell (501) and the third shell (502) electrically connecting a first signal electrode (212) with the analog front end circuitry (299); and

a second active trace (216) carried within the second shell (503) electrically connecting a second signal electrode (212) with the analog front end circuitry (299);

the second flexible circuit (550) comprises a third active trace (216) extending between the second shell (503) and the third shell (502), the third active trace (216) electrically connecting a third signal electrode (212) with the analog front end circuitry (299);

the first flexible circuit (550) further comprises a first pair of open leads (116A) with one of the pair of open leads electrically connected to each of the second active trace (216) and the third active trace (216) and extending along the first active trace (216), the first pair of open leads (116A) having a free end terminating proximal to the first signal electrode (212); and

the second flexible circuit (550) further comprises a second pair of open leads (116A) with a one of the pair of open leads (116A) electrically connected to each of the active trace (116) and the second active trace (116), the second pair of open leads (116A) extending along the third active trace (116), the second pair of open leads (116A) having a free end terminating proximal to the third signal electrode (212).