DEVICE WITH DISPOSABLE ELEMENT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 62/744,513, filed October 11, 2018, and U.S. Provisional Application No. 62/804,095, filed February 11, 2019, the contents of each of which are herein incorporated by reference in their entireties and for all purposes.

FIELD

[0002] The present disclosure provides apparatus and methods for a device for detecting tissue damage through measurement of Sub-Epidermal Moisture (SEM). The present disclosure further provides apparatus and methods for a device for detecting tissue damage through measurement of SEM, where the device includes a printed circuit board (PCB) assembled into a molded frame.

BACKGROUND

[0003] A printed circuit board (PCB) is employed in medical devices as a flat base that physically supports and electronically connects electronic components and conductors. PCBs may be single-sided, double-sided, and multilayered. PCBs are currently retained in device frames by either adhesive or provision of a lip in the frame that captures the edge of the PCB.

SUMMARY

[0004] According to a first aspect of the present disclosure, there is provided a detachable element for use with a reusable component having a retention groove and an alignment guide and a planar contact surface parallel to the retention groove, the detachable element including: a body including a retention feature configured to engage the retention groove, an electrical contactor coupled to the body, where the contactor includes a cantilever element that is configured to touch the planar contact surface when the retention feature is engaged with the retention groove, where the cantilever element is configured to slide along the contact surface as the detachable element is brought together with the reusable component; and a printed circuit board assembly (PCBA) comprising a printed circuit board (PCB) having an outer edge, wherein the PCB is coupled to the contactor and to the body, wherein a portion of the contactor extends beyond the outer edge of the PCB, and wherein the portion of the contactor that extends beyond the outer edge of the PCB is coupled to the body.

[0005] According to a second aspect of the present disclosure, there is provided a connector including: a reusable component including a body, retention groove and an electrical contact surface that is parallel to the retention groove, wherein the body of the reusable component includes an alignment guide; and a detachable element including a body with a retention feature configured to engage the retention groove and an electrical contactor coupled to the body of the detachable element, where the contactor includes a compliant element that is configured to touch the contact surface of the reusable element when the retention feature of the detachable element is engaged with the retention groove of the reusable component and to slide along the contact surface as the detachable element is brought together with the reusable component, and ~~an alignment feature that is configured to mate with the alignment guide when the retention feature of the detachable element is engaged with the retention groove of the reusable component, wherein the retention feature cannot engage the retention groove when the alignment feature is not mated with the alignment guide; and a printed circuit board assembly (PCBA) coupled to the body, comprising a printed circuit board (PCB) having a top~~

~~surface, wherein the top surface comprises a plurality of conductive planar contact surfaces~~a sensor comprising a central electrode and a toroidal electrode, and wherein the central electrode and the toroidal electrode have a concentric orientation.

~~**[0005a]** According to a third aspect of the present disclosure, there is provided a connector including: a reusable component comprising a retention groove and an electrical contact surface that is parallel to the retention groove; a detachable element comprising a body with a retention feature configured to engage the retention groove and an electrical contactor coupled to the body; and a printed circuit board assembly (PCBA) coupled to the body, comprising a printed circuit board (PCB) having a top surface, wherein the top surface comprises a plurality of conductive planar contact surfaces, wherein the contactor comprises a compliant element that is configured to touch the contact surface of the reusable element when the retention feature of the detachable element is engaged with the retention groove of the reusable component and to slide along the contact surface as the detachable element is brought together with the reusable component, and wherein the compliant element includes: a base segment coupled to the body, a first linear segment coupled to the base segment, a second linear segment coupled to the first linear segment, and a contact segment coupled to the second linear segment, wherein compression of the compliant element in a first direction induces motion of the contact segment in a second direction that is perpendicular to the first direction.~~

[0006] Disclosed herein is a detachable element comprising: a body comprising a hole and a retention pocket, where the retention pocket comprises a reference surface; and a printed circuit board assembly (PCBA) comprising a printed circuit board (PCB) having an outer edge and a contactor coupled to the PCB, where a portion of the contactor extends beyond the outer edge of the PCB, where the portion of the contactor that extends beyond the outer edge of the PCB is in contact with the reference surface. In an aspect, an external surface of a PCB is flush with a surface of a frame without a protruding lip or the use of adhesive.

[0007] Disclosed herein is a detachable element comprising: a body comprising upper and lower sections joined by a flexible arm, where the upper section comprises an opening and the lower section is attached on its underside to a compressible spring; and a printed film having tabbed and non-tabbed areas, where the tabbed area comprises a sensor comprising two electrodes on one first face, and where the tabbed area is inserted between the upper and lower sections so that the sensor is aligned with the opening.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Aspects of the disclosure are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and are for purposes of illustrative discussion of aspects of the disclosure. In this regard, the description and the drawings, considered alone and together, make apparent to those skilled in the art how aspects of the disclosure may be practiced.

[0009] Fig. 1A depicts a medical scanner, in accordance with the present disclosure.

[0010] Fig. 1B depicts a connector comprising a reusable component, which is part of the medical scanner of Fig. 1A in the region "A," and a detachable element, in accordance with the present disclosure.

CLAIMS

1. A detachable element for use with a reusable component having a retention groove and an alignment guide and a planar contact surface parallel to the retention groove, the detachable element comprising:

    a body comprising a retention feature configured to engage the retention groove;

    an electrical contactor coupled to the body, wherein the contactor comprises a cantilever element that is configured to touch the planar contact surface when the retention feature is engaged with the retention groove,

    wherein the cantilever element is configured to slide along the contact surface as the detachable element is brought together with the reusable component; and

    a printed circuit board assembly (PCBA) comprising a printed circuit board (PCB) having an outer edge, wherein the PCB is coupled to the contactor and to the body, wherein a portion of the contactor extends beyond the outer edge of the PCB, and wherein the portion of the contactor that extends beyond the outer edge of the PCB is coupled to the body.

2. The detachable element of claim 1, wherein the detachable element is brought together with the reusable component along a path that is perpendicular to the planar contact surface.

3. The detachable element of claim 1, wherein the retention feature extends around a portion of a circumference of the detachable element.

4. The detachable element of claim 1, wherein the body comprises an alignment feature that is configured to mate with the alignment guide of the reusable component, wherein the retention feature cannot engage the retention groove when the alignment feature is not mated with the alignment guide.

5. The detachable element of claim 1, wherein the body further comprises a sensor comprising two electrodes, wherein the sensor is in electrical connection with the electrical contactor.

6. The detachable element of claim 5, wherein the body further comprises an insulating cover layer disposed above the sensor.

7. The detachable element of claim 1, wherein the body further comprises a light sensor and a light emitting source, wherein the light sensor and light emitting source are in electrical connection with the electrical contactor.

8. The detachable element of claim 7, wherein the light emitting source comprises dual emitters configured for emitting 660 nm and 880 nm light.

9. A connector comprising:

a reusable component comprising a body, retention groove and an electrical contact surface that is parallel to the retention groove, wherein the body of the reusable component comprises an alignment guide; and

a detachable element comprising

a body with a retention feature configured to engage the retention groove and an electrical contactor coupled to the body of the detachable element, wherein the contactor comprises a compliant element that is configured to touch the contact surface of the reusable element when the retention feature of the detachable element is engaged with the retention groove of the reusable component and to slide along the contact surface as the detachable element is brought together with the reusable component; and

a sensor comprising a central electrode and a toroidal electrode, and wherein the central electrode and the toroidal electrode have a concentric orientation

~~an alignment feature that is configured to mate with the alignment guide when the retention feature of the detachable element is engaged with the retention groove of the reusable component, wherein the retention feature cannot engage the retention groove when the alignment feature is not mated with the alignment guide; and~~

~~a printed circuit board assembly (PCBA) coupled to the body, comprising a printed circuit board (PCB) having a top surface, wherein the top surface comprises a plurality of conductive planar contact surfaces~~.

10. The ~~A~~ connector of claim 9, wherein ~~comprising~~:

~~a~~ the reusable component comprises an alignment guide ~~comprising a retention groove and an electrical contact surface that is parallel to the retention groove~~;

~~a~~ the detachable element comprises an alignment feature that is configured to mate with the alignment guide when the retention feature of the detachable element is engaged with the retention groove of the reusable component ~~comprising a body with a retention feature configured to engage the retention groove and an electrical contactor coupled to the body~~; and

the retention feature cannot engage the retention groove when the alignment feature is not mated with the alignment guide

~~a printed circuit board assembly (PCBA) coupled to the body, comprising a printed circuit board (PCB) having a top surface, wherein the top surface comprises a plurality of conductive planar contact surfaces,~~

~~wherein the contactor comprises a compliant element that is configured to touch the contact surface of the reusable element when the retention feature of the detachable element is engaged with the retention groove of the reusable component and to slide along the contact surface as the detachable element is brought together with the reusable component,~~

~~and wherein the compliant element comprises:~~

~~a base segment coupled to the body,~~

~~a first linear segment coupled to the base segment,~~

~~a second linear segment coupled to the first linear segment, and~~

~~a contact segment coupled to the second linear segment,~~

~~wherein compression of the compliant element in a first direction induces motion of the contact segment in a second direction that is perpendicular to the first direction~~.

11. The detachable element of claim 5, wherein the two electrodes consist of one central electrode and one toroidal electrode, wherein the central electrode and toroidal electrode have a concentric orientation.

12. The detachable element of claim 11, wherein the central electrode has a diameter of about 4.318 mm (0.17 inches).

13. The detachable element of claim 11, wherein the toroidal electrode has an inner diameter of about 10.16 mm (0.4 inches) and an outer diameter of about 12.7 mm (0.5 inches).

14. The detachable element of claim 11, further comprising a ground plane, wherein the distance between the two electrodes and the ground plane is about 0.4064 mm (0.016 inches).

15. The detachable element of claim 11, where the two electrodes are separated by a gap of about 2.921 mm (0.0115 inches).

16. The detachable element of claim 14, wherein the ground plane has a diameter of about 12.7 mm (0.5 inches).

17. The connector of claim 9, wherein:

the compliant element comprises:

a base segment coupled to the body,

a first linear segment coupled to the base segment,

a second linear segment coupled to the first linear segment, and

a contact segment coupled to the second linear segment,

wherein compression of the compliant element in a first direction induces motion of the contact segment in a second direction that is perpendicular to the first direction.

18. The connector of claim 9, wherein the central electrode has a diameter of about 4.318 mm (0.17 inches).

19. The connector of claim 9, wherein the toroidal electrode has an inner diameter of about 10.16 mm (0.4 inches) and an outer diameter of about 12.7 mm (0.5 inches).

20. The connector of claim 9, further comprising a ground plane, wherein the distance between the two electrodes and the ground plane is about 0.4064 mm (0.016 inches).

21. The connector of claim 9, wherein the two electrodes are separated by a gap of about 2.921 mm (0.0115 inches).

22. The connector of claim 9, wherein the ground plane has a diameter of about 12.7 mm (0.5 inches).

23. The connector of claim 9, wherein the sensor is selected from a group consisting of a bioimpedance sensor, a photodetector, a temperature sensor, a pH sensor, a perspiration sensor, an ultrasonic sensor, a bone growth stimulator sensor, and combinations thereof.

24. The connector of claim 9, further comprising a printed circuit board assembly (PCBA) coupled to the body, comprising a printed circuit board (PCB) having a top surface, wherein the top surface comprises a plurality of conductive planar contact surfaces.