

CLAIMS

1. A system (300) for determining an admittance or conductance, the system comprising:
an intravascular device (318) configured to be inserted into a patient's heart; and
an electrode assembly patch (320, 400, 600, 700, 800) attached to at least a portion of the intravascular device (318), wherein the electrode assembly patch (320, 400, 600, 700, 800) includes a multi-layered construction comprising:
a first non-conductive layer configured to be adhered to the portion of the intravascular device;
a second layer having one or more wires (456a-456d);
a third non-conductive layer configured to electrically insulate the one or more wires (456a-456d); and
a fourth layer including one or more electrodes (454a-454d).
2. The system (300) of claim 1, wherein the first non-conductive layer may be formed from a polymer material configured to be glued, bonded and/or thermoformed to the portion of the intravascular device (318).
3. The system (300) of claim 1 or 2, wherein each of the one or more wires (456a-456d) are spaced apart by a non-conductive material.
4. The system (300) of one of claims 1 to 3, wherein the one or more wires (456a-456d) are formed from a conductive material.
5. The system (300) of claim 4, wherein the conductive material includes platinum, gold, silver, and/or copper.
6. The system (300) of one of claims 1 to 5, wherein the one or more electrodes (454a-454d) in the fourth layer are at least partially exposed.
7. The system (300) of one of claims 1 to 6, wherein the multi-layered construction includes four sandwiched layers.
8. The system (300) of one of claims 1 to 7, wherein the layers are glued, bonded, and/or thermoformed together.
9. The system (300) of one of claims 1 to 8, wherein the electrode assembly patch (320, 400, 600, 700, 800) includes:
a strip (404, 604, 704, 804) extending from a proximal end (402, 602, 702, 802) to a distal end (408, 608, 708, 808);

a first electrode tab (406a, 606a, 706a, 806a) extending outwardly and away from the strip (404, 604, 704, 804), the first electrode tab configured to provide a current to an ambient fluid;

a second electrode tab (406b, 606b, 706b, 806b) spaced from the first electrode tab (406a, 606a, 706a, 806a), the second electrode tab (406b, 606b, 706b, 806b) extending outwardly and away from the strip (404, 604, 704, 804), the second electrode tab (406b, 606b, 706b, 806b) configured to measure voltage in the ambient fluid;

a third electrode tab (406c, 606c, 706c, 806c) spaced from the second electrode tab (406b, 606b, 706b, 806b), the third electrode tab (406c, 606c, 706c, 806c) extending outwardly and away from the strip (404, 604, 704, 804), the third electrode tab (406c, 606c, 706c, 806c) configured to measure voltage in the ambient fluid; and

a fourth electrode tab (406d, 606d, 706d, 806d) spaced from the third electrode tab (406c, 606c, 706c, 806c), the fourth electrode tab (406d, 606d, 706d, 806d) extending outwardly and away from the strip (404, 604, 704, 804), the fourth electrode tab (406d, 606d, 706d, 806d) configured to provide a current to the ambient fluid.

10. The system (300) of claim 9, wherein the first (406a, 606a, 706a, 806a), second (406b, 606b, 706b, 806b), third (406c, 606c, 706c, 806c), and fourth electrode tabs (406d, 606d, 706d, 806d) extend outwardly and away from a first side of the strip (404, 604, 704, 804) in a first direction.
11. The system (300) of claim 10, further comprising:
 - a first stabilizing tab (408a, 608a) extending outwardly and away from a second side of the strip (404, 604) in a second direction opposite the first direction; and
 - a second stabilizing tab (408b, 608b) spaced from the first stabilizing tab (408a, 608a) and extending outwardly away from the strip (404, 604) in the second direction.
12. The system (300) of claim 11, wherein a width of the first stabilizing tab (408a, 608a) is less than or equal to a first lateral distances between the first and second electrode tabs (406a, 406b, 606a, 606b) and wherein a width of the second stabilizing tab (408b, 608b) is less than or equal to a second lateral distance between the third and fourth electrode tabs (406c, 406d, 606c, 606d).
13. The system (300) of one of claims 9 to 12, further comprising:
 - a controller (302) electrically connected to the electrode assembly patch (320, 400, 600, 700, 800), the controller (302) comprising:
 - a current source (314);
 - a memory (306); and
 - one or more processors (304) coupled to the memory (306) and configured to:
 - provide an alternating current to electrodes (454a-454d) of the first electrode tab (406a) and the fourth electrode tab (406d);

measure voltages through electrodes (454a-454d) of the second electrode tab (406b) and the third electrode tab (406c); and

determine an admittance or a conductance based on the measured voltages of the second electrode tab (406b) and the third electrode tab (406c).

14. The system (300) of one of claims 9 to 13, wherein the electrode assembly patch (320, 400, 600, 700, 800) is configured to have a two-dimensional configuration in an undeployed state and wherein the electrode assembly patch (320, 400, 600, 700, 800) is further configured to have a three-dimensional configuration in a deployed state.
15. The system (300) of any one of claim 1 to 14, wherein each layer having a thickness of 1 to 10 μm , wherein each layer having a thickness of preferably 5 μm .