

CLAIMS

1. A method, comprising:
 - passivating at least one fissure in a passivation layer of a sensor, the sensor comprising a metal containing layer, the passivation layer disposed over the metal containing layer, and a structure forming a flow channel above a top active surface of the passivation layer, a top portion of the structure including an electrode, wherein the passivating comprises:
 - applying an aqueous solution comprising a polymer precursor and an electrolyte to the flow channel of the structure;
 - applying a first voltage to the metal containing layer of the sensor;
 - applying a second voltage to the electrode, the second voltage being a voltage of an opposite polarity to the first voltage; and
 - forming a polymer formation extending up from the metal containing layer at the at least one fissure to a top surface of the passivation layer.
2. The method of claim 1, wherein the polymer precursor oxidizes electrochemically under the applied voltage, forming a polymer chain growth at the metal containing layer within the fissure.
3. The method of claim 2, wherein the polymer chain growth deposits within the fissure, forming a coating.
4. The method of claim 1, wherein the sensor comprises a semiconductor device.
5. The method of claim 4, wherein the semiconductor device comprises a complementary metal-oxide semiconductor (CMOS) biosensor.
6. The method of claim 1, wherein the passivating further comprises:
 - removing the first voltage and the second voltage when the polymer formation at least partially fills the at least one fissure.
7. The method of claim 6, wherein the electrolyte comprises a sulfosuccinate sodium salt.
8. The method of claim 6, further comprising:

converting the polymer formation to an electrically insulating polymer formation.

9. The method of claim 1, wherein the polymer precursor comprises pyrrole, aniline, or a combination thereof.
10. Apparatus, comprising:
 - a sensor having a passivation layer including at least one fissure, the at least one fissure having at least one polymer formation deposited therein and extending vertically within the passivation layer, the sensor comprising:
 - a metal containing layer;
 - the passivation layer deposited over the metal containing layer; and
 - a structure forming a flow channel above a top active surface of the passivation layer.
11. The apparatus of claim 10, wherein the sensor further comprises:
 - the at least one polymer formation extending from a top surface of the passivation layer into the metal containing layer and at least partially blocking the metal containing layer.
12. The apparatus of claim 10, wherein the at least one polymer formation comprises polypyrrole, polyaniline, or a combination thereof.
13. The apparatus of claim 12, wherein the at least one polymer formation is one of a conductive polymer or an insulating polymer.
14. The apparatus of claim 10, wherein the sensor further includes:
 - an ancillary electrode disposed on a top surface of the structure.
15. The apparatus of claim 10, wherein the sensor comprises a semiconductor.
16. The apparatus of claim 15, wherein the semiconductor comprises a complementary metal-oxide-semiconductor (CMOS) biosensor.
17. The apparatus of claim 10, wherein a protective layer on the active surface of the sensor comprises a plurality of nanowells.

18. Apparatus, comprising:
 - a complementary metal-oxide semiconductor (CMOS) biosensor comprising:
 - an active metal containing layer;
 - a passivation layer over the active metal containing layer;
 - a plurality of functionalized molecules deposited on the passivation layer;
 - a structure forming a flow cell above a top active surface of the passivation layer;
 - an ancillary electrode disposed on a top surface of the structure; and
 - a polymer formation filling at least one fissure within the passivation layer, the polymer formation being wider at the top active surface of the passivation layer and extending vertically to the metal layer to block a corrosive aqueous solution from penetrating the at least one fissure in the passivation layer.
19. The apparatus of claim 18, wherein the fissure comprises a crack in the passivation layer extending to within the active metal containing layer.
20. The apparatus of claim 19, wherein the crack is between about 5 nanometers and about 10 micrometers wide.