CLAIMS

What is claimed is the following:

1. A pH sensor comprising:

a sensor tail comprising a first working electrode, a second working electrode, and at least one other electrode;

a first active portion located upon the first working electrode, the first active portion comprising a substance having pH-dependent oxidation-reduction chemistry; ~~and~~

a second active portion located upon the second working electrode, the second active portion comprising a substance having oxidation-reduction chemistry that is substantially invariant with pH

a membrane overcoating the first active portion, the second active portion, or the first active portion and the second active portion,

wherein the first working electrode is configured to produce a first signal and the second working electrode is configured to produce a second signal, and a difference between the first signal and the second signal correlates to pH.

2. The pH sensor of claim 1, wherein the sensor tail is configured for insertion in a tissue.

3. The pH sensor of any preceding claim, wherein the substance having pH-dependent oxidation-reduction chemistry comprises a quinone, a redox indicator compound, or any combination thereof.

4. The pH sensor of claim 3, wherein the substance having pH-dependent oxidation-reduction chemistry comprises a redox indicator compound

comprising a thiazine.

5. The pH sensor of any preceding claim, wherein the at least one other electrode comprises a counter electrode and a reference electrode.

6. The pH sensor of claim 5, further comprising:

a dielectric layer interposed between the at least one other electrode and at least one of the first working electrode and the second working electrode.

7. The pH sensor of claim 6, wherein a first dielectric layer is interposed between the first working electrode and the counter electrode or the reference electrode and a second dielectric layer is interposed between the second working electrode and the counter electrode or the reference electrode.

8. The pH sensor of ~~any preceding claim~~any one of claims 1-3, wherein the at least one other electrode comprises a counter/reference electrode.

9. The pH sensor of claim 8, further comprising:

a dielectric layer interposed between the counter/reference electrode and at least one of the first working electrode and the second working electrode.

~~10. The pH sensor of any preceding claim, wherein the first working electrode is configured to produce a first signal and the second~~

~~working electrode is configured to produce a second signal, and a difference between the first signal and the second signal correlates to pH.~~

~~11~~10. The pH sensor of claim ~~10~~1, further comprising:

a processor configured to receive the first signal from the first working electrode and the second signal from the second working electrode;

wherein the processor is further configured to calculate the difference between the first signal and the second signal, and to correlate the difference to pH.

~~12~~11. The pH sensor of claim ~~11~~10, wherein the processor is configured to access a lookup table comprising a plurality of pH values and corresponding differences between the first signal and the second signal in order to calculate pH.

~~13~~12. The pH sensor of claim ~~11~~10, wherein the processor is configured to access a calibration curve of pH values versus corresponding differences between the first signal and the second signal in order to calculate pH.

~~14~~13. The pH sensor of ~~any preceding~~ claim 1, wherein the substance having pH-dependent oxidation-reduction chemistry is covalently bound to a polymer in the first active portion and the substance having oxidation-reduction chemistry that is substantially invariant with pH ~~are both~~ is covalently bound to a polymer ~~in the first active portion~~ and the second active portion~~, respectively~~.

~~15~~14. A method comprising:

exposing the pH ~~of claim 1~~ sensor of claim 1 to a fluid having a pH value;

measuring ~~a~~ the first signal associated with the first working electrode;

measuring ~~a~~ the second signal associated with the second working electrode;

calculating ~~a~~ the difference between the first signal and the second signal; and

correlating the difference between the first signal and the second signal to the pH value;

wherein the fluid is a biological fluid and the pH sensor is exposed to the biological fluid *in vivo*.