CLAIMS

1. A device comprising:

(a) an implantable device which has an *in vivo* functionality; and~~;~~

(b) a protective material in close proximity to a surface of the implantable device wherein:

(1) the protective material prevents or reduces degradation or interference of the implantable device due to inflammation reactions and/or foreign body response; and

(2) the protective material comprises a metal or metal oxide which catalytically decomposes or inactivates *in vivo* reactive oxygen species or biological oxidizers~~.~~.

~~2. The device of claim 1,~~ wherein the device is a sensor having an *in vivo* functionality, the sensor comprising:

a sensor body encasing a photosensitive detector element and a light source, the sensor body comprising an exterior surface;

a porous sensor graft on at least a portion of the exterior surface of the sensor body, wherein the porous graft comprises one or more indicator macromolecules,

wherein the protective material is in close proximity to the porous sensor graft, and wherein the protective material prevents or reduces degradation or interference of the porous sensor graft due to inflammation reactions and/or foreign body response.

2~~3~~. The device of claim 1~~2~~, wherein the sensor is for monitoring glucose levels.

~~4. The device of claim 2, wherein the sensor comprises a body at least partially surrounding a photosensitive detector element and a light source, and further wherein an external surface of the sensor body comprises a porous sensor graft layer that comprises one or more indicator macromolecules.~~

35. The device of claim 14, wherein the one or more indicator macromolecules comprises a phenylboronic acid residue.

46. The device of claim 1, wherein the protective material is a structure that comprises a cylinder or ring at least partially surrounding the porous sensor graft~~device~~.

57. The device of claim 1, wherein the protective material is a structure that comprises a coil, mesh, weave, or perforated and/or slotted structure at least partially surrounding the porous sensor graft~~device~~.

68. The device of claim 1, wherein the metal or metal oxide comprises silver, palladium, platinum, manganese, or alloys, or gold-inclusive alloys, or combinations thereof.

79. The device of claim 1, wherein the porous sensor graft~~device~~ is made from a material that is sensitive to, or is susceptible to damage from, oxidation.

810. The device of claim 1, wherein the protective material~~structure~~ is in close proximity to at least a part of the sensor body~~implantable device~~ that comprises a polymer.

911. The device of claim 1, wherein the protective material is from about 0.5 nm to about 2.5 mm thick.

1012. A device comprising:

(a) an implantable device which has an *in vivo* functionality and;

(b) a layer of protective coating applied onto the implantable device wherein:

(1) the protective coating prevents or reduces degradation or interference of the implantable device from inflammation reactions and/or foreign body response; and

(2) the protective coating comprises a metal or metal oxide which catalytically decomposes or inactivates *in vivo* reactive oxygen species or biological oxidizers.

~~13. The device of claim 12,~~ wherein the device is a sensor having an *in vivo* functionality, the sensor comprising:

a sensor body encasing a photosensitive detector element and a light source, the sensor body comprising an exterior surface;

a porous sensor graft on at least a portion of the exterior surface of the sensor body, wherein the porous graft comprises one or more indicator macromolecules,

wherein the layer of protective coating is applied onto one or more of a portion or all of the porous sensor graft and a portion or all of the exterior surface of the sensor body, and wherein the protective coating prevents or reduces degradation or interference of the porous sensor graft from inflammation reactions and/or foreign body response.

11~~14~~. The device of claim 10~~13~~, wherein the sensor is for monitoring glucose levels.

~~15. The device of claim 13, wherein the sensor comprises a body surrounding a photosensitive detector element and a light source, and further wherein an external surface of the sensor body comprises a porous sensor graft layer that comprises one or more indicator macromolecules.~~

12~~16~~. The device of claim 10~~15~~, wherein the one or more indicator macromolecules comprises a phenylboronic acid residue.

13~~17~~. The device of claim 10~~12~~, wherein the protective coating is applied by sputter

deposition.

1418. The device of claim 1012, wherein the metal or metal oxide comprises silver, palladium, platinum, manganese, or alloys, or gold-inclusive alloys, or combinations thereof.

1519. The device of claim 1012, wherein the protective coating is from about 0.5 nm to about 500 nm thick.

2016. The device of claim 1012, wherein the protective coating is from about 1 nm to about 20 nm thick.

2117. The device of claim 1012, wherein the protective coating is from about 3 nm to about 6 nm thick.

2218. The device of claim 1012, wherein the protective coating is at least about 1 nm thick.

2319. The device of claim 1015, wherein the sensor body has a saddle-cut shape.

2420. The device of claim 1012, wherein the porous sensor graftdevice is made from a material that is sensitive to, or is susceptible to damage from, oxidation.

2521. The device of claim 1012, wherein the protective coating is applied onto at least a part of the sensor bodyimplantable device that comprises a polymer.

2226. The device of claim 1012, wherein the sensorimplantable device has an *in vivo* functionality for a substantially elongated period of time, as compared to the useful life of a separate material with *in vivo* utility but without the layer of protective coating, following implant in an environment where the

sensor~~implantable device~~ is exposed to inflammation reactions and/or foreign body response.

2327. A method for using an implantable device for *in vivo* applications comprising:

(a) providing an implantable device which has an *in vivo* functionality, and which comprises a layer of a protective coating on the device wherein:

(1) the protective coating prevents or reduces degradation or interference of the implantable device due to inflammation reactions and/or foreign body response; and

(2) the protective coating comprises a metal or metal oxide which catalytically decomposes or inactivates *in vivo* reactive oxygen species or biological oxidizers; and

(b) implanting the implantable device in a subject body, the implantable device being a sensor, wherein the step of implanting the implantable device in the subject body comprises implanting the sensor in the subject body, wherein the sensor has an *in vivo* functionality and comprises a sensor body encasing a photosensitive detector element and a light source and comprising an exterior surface; a porous sensor graft on at least a portion of the exterior surface of the sensor body, the porous graft comprising one or more indicator macromolecules; and the layer of protective coating on one or more of a portion or all of the porous sensor graft and a portion or all of the exterior surface of the sensor body.

2428. The method of claim 2327, wherein the *in vivo* functionality of the sensor~~implantable device~~ is to operate as a sensor designed to detect glucose.

~~29. The method of claim 27, wherein the device comprises a sensor body surrounding a photosensitive detector element and a light source, and further wherein an external surface of the sensor body comprises a porous sensor graft layer that comprises one or more indicator molecules.~~

2530. The method of claim 2329, wherein the one or more indicator molecules comprises a phenylboronic acid residue.

2631. The method of claim 2327, wherein the protective coating is applied by sputter deposition.

2732. The method of claim 2327, wherein the metal or metal oxide comprises silver, palladium, platinum, manganese, or alloys, or gold-inclusive alloys, or combinations thereof.

3328. The method of claim 2327, wherein the protective coating is from about 0.5 nm to about 500 nm thick.

3429. The methoddevice of claim 2327, wherein the protective coating is from about 1 nm to about 20 nm thick.

3035. The methoddevice of claim 2327, wherein the protective coating is from about 3 nm to about 6 nm thick.

3136. The method of claim 2327, wherein the protective coating is at least about 1 nm thick.

3237. The method of claim 2329, wherein the sensor body has a saddle-cut shape.

3338. The method of claim 2327, wherein the *in vivo* functionality of the sensorimplantable device is to operate as a sensor designed to detect a target analyte.

3439. The method of claim 2327, wherein the porous sensor graftdevice is made from a material that is sensitive to, or is susceptible to damage from, oxidation.

3540. The method of claim 2327, wherein the protective coating is applied onto at least a part of the sensor body~~implantable device~~ that comprises a polymer.

4136. The method of claim 2327, wherein the sensor~~implantable device~~ has an *in vivo* functionality for a substantially elongated period of time, as compared to the useful life of a separate material with *in vivo* utility but without the layer of protective coating, following implant in an environment where the sensor~~implantable device~~ is exposed to inflammation reactions and/or foreign body response.

3742. A method for detecting the presence or concentration of an analyte in an *in vivo* sample, said method comprising:

(a) exposing the sample to a device having a detectable quality that changes when the device is exposed to the analyte, said device comprising a layer of protective coating applied onto the implantable device wherein:

(1) the protective coating prevents or reduces degradation or interference of the device from inflammation reactions and/or foreign body response; and

(2) the protective coating comprises a metal or metal oxide which catalytically decomposes or inactivates *in vivo* reactive oxygen species or biological oxidizers,

such that the device has enhanced resistance to degradation or interference as compared to a corresponding device without the protective coating; and

(b) measuring any change in said detectable quality to thereby determine the presence or concentration of said analyte in said sample,

wherein the step of exposing the sample to the device comprises exposing the sample to a porous sensor graft of a sensor, the porous sensor graft having a detectable quality that changes when the porous sensor graft is exposed to the analyte, said sensor

comprising a sensor body encasing a photosensitive detector element and a light source and comprising an exterior surface; a porous sensor graft on at least a portion of the exterior surface of the sensor body, the porous graft comprising one or more indicator macromolecules; and the layer of protective coating being applied onto one or more of a portion or all of the porous sensor graft and a portion or all of the exterior surface of the sensor body.

4338. The method of claim 4237, wherein the analyte is glucose.

~~44. The method of claim 42, wherein the device comprises a sensor body surrounding a photosensitive detector element and a light source, and further wherein an external surface of the sensor body comprises a porous sensor graft layer that comprises one or more indicator molecules.~~

4539. The method of claim 4437, wherein the one or more indicator molecules comprises a phenylboronic acid residue.

4640. The method of claim 3742, wherein the protective coating is applied by sputter deposition.

4741. The method of claim 3742, wherein the metal or metal oxide comprises silver, palladium, platinum, manganese, or alloys, or gold-inclusive alloys or combinations thereof.

4842. The method of claim 3742, wherein the protective coating is from about 0.5 nm to about 500 nm thick.

4943. The methoddevice of claim 3742, wherein the protective coating is from about 1 nm to about 20 nm thick.

44~~50~~. The method~~device~~ of claim 37~~42~~, wherein the protective coating is from about 3 nm to about 6 nm thick.

5~~1~~45. The method of claim 37~~42~~, wherein the protective coating is at least about 1 nm thick.

5~~2~~46. The method of claim 3744, wherein the sensor body has a saddle-cut shape.

5~~3~~47. The method of claim 37~~42~~, wherein the porous graft sensor~~device~~ is made from a material that is sensitive to, or is susceptible to damage from, oxidation.

48~~5~~4. The method of claim 37~~42~~, wherein the sensor body~~protective coating is applied onto at least a part of the implantable device that~~ comprises a polymer.

49~~5~~5. The method of claim 37~~42~~, wherein the sensor~~implantable device~~ has an *in vivo* functionality for a substantially elongated period of time, as compared to the useful life of a separate material with *in vivo* utility but without the layer of protective coating, following implant in an environment where the sensor~~implantable device~~ is exposed to inflammation reactions and/or foreign body response.

50~~5~~6. An implantable glucose sensor for determining the presence or concentration of glucose in an animal, said sensor comprising:

(a) a sensor body having an outer surface surrounding said sensor body;

(b) a radiation source in said sensor body which emits radiation within said sensor body;

(c) an indicator element that is affected by the presence or concentration of glucose in said animal, said indicator element being positioned in close proximity to at least a portion of said outer surface of said sensor body;

(d) a photosensitive element located in said sensor body and positioned to receive radiation within the sensor body, said photosensitive element configured to emit a signal responsive to radiation received from said indicator element and which is indicative of the presence or concentration of glucose in said animal; and

(e) a protective barrier comprising silver, palladium, platinum, manganese, or alloys, or gold-inclusive alloys, or combinations thereof, at least partially surrounding said indicator element.

5157. The sensor of claim 5650, wherein the outer surface is comprised of a polymer.

5258. The sensor of claim 5650, wherein the indicator element comprises at least one indicator macromolecule.

5359. The sensor of claim 5056, wherein the protective barrier is further comprised of oxides of silver, platinum, palladium, manganese, alloys, or gold-inclusive alloys, or combinations thereof.

5460. The sensor of claim 5056, wherein the protective barrier is a structural encasement in the form of a wire, mesh, weave, or a perforated and/or slotted encasement at least partially surrounding said indicator elementporous graft.

5561. The sensor of claim 5056, wherein the protective barrier is a coating directly covering at least a part of said indicator elementporous graft.

6256. A pacemaker comprising:

(a) an electrical generator;

(b) lead wires connected to said electrical generator; and

(c) a protective material in close proximity to or comprising at least a surface of the pacemaker leads wherein:

(1) the protective material prevents or reduces degradation or interference of the pacemaker leads due to inflammation reactions and/or foreign body response; and

(2) the protective material comprises a metal or metal oxide which catalytically decomposes or inactivates *in vivo* reactive oxygen species or biological oxidizers.

57. A device comprising:

(a) an implantable device which has an *in vivo* functionality and;

(b) a protective material in close proximity to a surface of the implantable device wherein:

(1) the protective material prevents or reduces degradation or interference of the implantable device due to inflammation reactions and/or foreign body response; and

(2) the protective material comprises a metal or metal oxide which catalytically decomposes or inactivates *in vivo* reactive oxygen species or biological oxidizers.

58. A device comprising:

(a) an implantable device which has an *in vivo* functionality and;

(b) a layer of protective coating applied onto the implantable device wherein:

(1) the protective coating prevents or reduces degradation or interference of the implantable device from inflammation reactions and/or foreign body response; and

(2) the protective coating comprises a metal or metal oxide which catalytically decomposes or inactivates *in vivo* reactive oxygen species or biological oxidizers.