Claims

1. A sensor comprising a mutated biomolecule immobilised to a substrate; wherein the mutated biomolecule is immobilised to the substrate *via* a linker comprising a thiol reactive group and a substrate adherence group; wherein the biomolecule is mutated to introduce one or more surface accessible thiol moieties; and wherein the mutated biomolecule is connected to the linker *via* said one or more surface accessible thiol moieties on the biomolecule and said thiol reactive group on the linker, provided that the mutated biomolecule is not glucose oxidase, concanavalin A, glucose binding protein, or carbohydrate oxidase.

2. A sensor comprising a biomolecule immobilised to a substrate *via* a linker, wherein the linker is connected to the biomolecule through a thiol linkage, and wherein the substrate is a material having optical or charge carrying properties, provided that the mutated biomolecule is not glucose oxidase, concanavalin A, glucose binding protein, or carbohydrate oxidase.

3. The sensor of claim 2, wherein the thiol linkage is between one or more surface accessible thiol moieties on the biomolecule and thiol reactive group(s) on the linker.

4. The sensor according to claim 3, wherein the biomolecule comprises one or more mutations, wherein said one or more mutations introduce said one or more surface-exposed thiol moieties.

5. The sensor according to claim 1 or claim 4, wherein said mutation is a substitution, wherein preferable the substituted residue is selected from a cysteine, selenocysteine or a non-natural amino acid including a thiol group.

6. The sensor according to any preceding claim, wherein the biomolecule is ~~glucose oxidase, concanavalin A, glucose binding protein,~~ cholesterol oxidase or lactate oxidase.

7. The sensor according to any preceding claim, wherein the substrate is a carbon nanomaterial, preferably a carbon nanocarrier, single walled carbon nanotube (SWCNT), graphene, fullerene, multi-walled carbon nanotube (MWCNT) or single-walled carbon nanohorn, more preferably a single walled carbon nanotube (SWCNT).

8. The sensor according to any preceding claim, wherein the linker is a hydrophobic linker and/or the linker does not comprise DNA.

9. The sensor according to any preceding claim, wherein the biomolecule is mutated to introduce one or more surface accessible thiol moieties at a position or positions other than the C-terminus of the biomolecule.

10. The sensor according to any preceding claim, wherein the substrate comprises a plurality of biomolecules immobilised on its surface, and wherein the biomolecules are immobilised in an ordered manner.

11. A method of obtaining structured immobilisation of biomolecules on a substrate, comprising modifying the biomolecules to comprise one or more surface-exposed thiol moieties; attaching linking groups to said modified biomolecules *via* the surface-exposed thiol moieties and a thiol reactive group on the linking group; and adhere~~e~~ing the biomolecules to the substrate via a substrate adherence group on the linker;

preferably wherein the substrate is a carbon nanomaterial, further preferably wherein the carbon nanomaterial is a carbon nanocarrier, single walled carbon nanotube (SWCNT), graphene, fullerene, multi-walled carbon nanotube (MWCNT) or single-walled carbon nanohorn, more preferably a single walled carbon nanotube (SWCNT), provided that the biomolecules are not glucose oxidase, concanavalin A, glucose binding protein, or carbohydrate oxidase.

12. A ~~glucose oxidase polypeptide comprising one or more mutations, a carbohydrate oxidase polypeptide comprising one or more mutations or a~~ lactate oxidase polypeptide comprising one or more mutations; wherein said one or more mutations introduces a site-selective thiol conjugation site selected to permit conjugation of the polypeptide to a linker comprising a thiol reactive group, preferably wherein the mutation is a substitution, wherein preferably the substituted residue is selected from a cysteine or a non-natural amino acid containing a thiol group.

~~13. The polypeptide of claim 12, wherein the sequence of glucose oxidase comprises the sequence defined in SEQ ID NO: 1 or a functional variant thereof and wherein the sequence further comprises a mutation at one or more of positions 13, 70, 418 and 446 in SEQ ID NO: 1, preferably wherein the sequence of glucose oxidase is selected from SEQ ID NO: 2, 3, 4 or 5 or a functional variant thereof, wherein X is selected from a cysteine or a non-natural amino acid containing a thiol group.~~

~~14~~13. A method of producing a sensor, comprising:

a) providing a biomolecule comprising one or more surface exposed thiol moieties;

b) contacting the biomolecule with a linker comprising a thiol reactive group such that the linker covalently links to the biomolecule via the thiol reactive group;

c) adhering the biomolecule-linker to a substrate, wherein the biomolecule-linker adheres via the linker,

provided that the biomolecule is not glucose oxidase, concanavalin A, glucose binding protein, or carbohydrate oxidase.