There is thus a need to address the above drawbacks to realise a sensor having a microelectrode array configuration.

SUMMARY

According to a first aspect of the invention, there is provided an analyte sensor comprising a passivation layer comprising at least one nano-sized to micro-sized trench for receiving an analyte; an electrode disposed within the at least one nano-sized to micro-sized trench of the passivation layer, the electrode comprising atomically thin electrode materials from any one or more of graphene, derivatives of graphene, silicene, molybdenum disulfide or boron nitride; and a conductive substrate layer having a portion in contact with at least the ~~organic/non-metallic~~ electrode.

According to a second aspect of the invention, there is provided an analyte sensor comprising an array of nano-sized to micro-sized electrodes to receive an analyte, the array comprising an electrode indented in a passivation layer, the electrode comprising atomically thin electrode materials from any one or more of graphene, derivatives of graphene, silicene, molybdenum disulfide or boron nitride; and a conductive substrate layer having a portion in contact with at least the array of nano-sized to micro-sized electrodes.

According to a third aspect of the invention, there is provided a method of fabricating an analyte sensor, the method comprising forming a conductive substrate layer; forming at least one electrode in contact with a portion of the conductive substrate layer, the electrode comprising any one or more of graphene, derivatives of graphene, silicene, molybdenum disulfide or boron nitride; and forming a passivation layer having a nano-sized to micro-sized trench within which the at least one electrode is disposed.

BRIEF DESCRIPTION OF THE DRAWINGS

Example embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings. The drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the invention, in which:

CLAIMS

1. An analyte sensor comprising

a passivation layer comprising at least one nano-sized to micro-sized trench for receiving an analyte;

an electrode disposed within the at least one nano-sized to micro-sized trench of the passivation layer, the electrode comprising atomically thin electrode materials from any one or more of graphene, derivatives of graphene, silicene, molybdenum disulfide or boron nitride; and

a conductive substrate layer having a portion in contact with at least the ~~organic/non-metallic~~ electrode.

2. The analyte sensor of claim 1 wherein there is no contact between the conductive substrate layer and the passivation layer.

3. The analyte sensor of claim 1 wherein the conductive substrate layer is also in contact with the passivation layer.

4. The analyte sensor of any one of the preceding claims, wherein the conductive substrate layer comprises any one or more of the following materials indium tin oxide, copper, platinum or gold.

5. An analyte sensor comprising

an array of nano-sized to micro-sized electrodes to receive an analyte, the array comprising an electrode indented in a passivation layer, the electrode comprising atomically thin electrode materials from any one or more of graphene, derivatives of graphene, silicene, molybdenum disulfide or boron nitride; and

a conductive substrate layer having a portion in contact with at least the array of nano-sized to micro-sized electrodes.

6. A method of fabricating an analyte sensor, the method comprising

forming a conductive substrate layer;

forming at least one electrode in contact with a portion of the conductive substrate layer; and

forming a passivation layer having a nano-sized to micro-sized trench within which the at least one electrode is disposed.

7. The method of claim 6, wherein the conductive substrate layer is also in contact with the passivation layer.

8. The method of claim 7, wherein the formation of the at least one electrode and the passivation layer comprises the steps of:

forming an electrode layer over the conductive substrate layer;

removing portions of the electrode layer to expose the conductive substrate layer, wherein the remaining portions of the electrode layer form the at least one ~~organic/non-metallic~~ electrode;

forming the passivation layer over the at least one electrode and the conductive substrate layer; and

removing portions of the passivation layer to form the nano-sized to micro-sized trenches that expose the electrode.

9. The method of claim 8, wherein the formation of the at least one electrode and the passivation layer further comprises the steps of:

forming a mask layer over the electrode layer after the formation of the electrode layer;

patterning the mask layer to retain the remaining portions of the electrode layer when portions of the electrode layer are removed to expose the conductive substrate layer;

wherein the passivation layer is formed over the patterned mask layer in addition to the at least one electrode and the conductive substrate layer, and

wherein exposing the electrode further comprises removing the patterned mask layer.

10. The method of claims 6 to 9, wherein the electrode comprises any one or more of atomically thin electrode materials from graphene, derivatives of graphene, silicene, molybdenum disulfide or boron nitride.

Analyte sensor and fabrication thereof

ABSTRACT

According to one aspect of the invention, there is provided an analyte sensor comprising a passivation layer comprising at least one nano-sized to micro-sized trench for receiving an analyte; an electrode disposed within the at least one nano-sized to micro-sized trench of the passivation layer, the electrode comprising atomically thin electrode materials from any one or more of graphene, derivatives of graphene, silicene, molybdenum disulfide or boron nitride; and a conductive substrate layer having a portion in contact with at least the ~~organic/non-metallic~~ electrode.

Figure 1A