CLAIMS

1. An analyte sensor for use in medical devices for measuring analyte data in an analyte carrying fluid, in particular for measuring glucose data, comprising:

   a first electrode (101) being a working electrode,

   a second electrode,

   a substrate (100) carrying the first electrode and the second electrode,

   at least one membrane (104) which at least partially covers the first electrode (101),

   wherein the at least one membrane (101) comprises a membrane material that is impermeable to the analyte carrying fluid and/or the analyte, wherein the at least one membrane comprises at least one opening (107),

   and wherein the at least one membrane (104) is configured for controlling the flux of the analyte carrying fluid and/or the analyte to the first electrode (101) via the at least one opening (107).

2. The analyte sensor according to the preceding claim, wherein the diameter of the at least one opening (107) is similar to the thickness of the at least one membrane (104), e.g. in the range of 10 to 100 micrometers.

3. The analyte sensor according to one of the preceding claims, wherein the at least one opening (107) has been formed by a laser ablation process.

4. The analyte sensor according to one of the preceding claims, wherein the at least one opening (107) is at least partially filled with a material (103) that is permeable to the analyte carrying fluid and/or the analyte, e.g. a hydrophilic polymer that is optionally selected from the group consisting of a polyvinylpyridine based copolymer, a polyurethane and a hydrogel.

5. The analyte sensor according to claim 4, wherein the material (103) that is permeable to the analyte carrying fluid and/or the analyte is covering at least partially the first electrode (101) and/or the second electrode.

6. The analyte sensor according to one of the preceding claims, wherein the membrane (104) is hydrophobic.

7. The analyte sensor according to one of the preceding claims, further comprising a sensing layer (102), wherein the sensing layer (102) is configured for providing at least one enzyme to the first electrode (101).

8. The analyte sensor according to one of the preceding claims, wherein the first electrode (101) and the second electrode are arranged on opposing sides of the substrate (100).

9. The analyte sensor according to one of the preceding claims, wherein the second electrode is an electrode selected from a group comprising the following types: a counter electrode and a combined counter/reference electrode and/or wherein the second electrode is an oxygen electrode that is configured to use oxygen solved in the analyte carrying fluid as electron acceptor and wherein the second electrode can comprise gold or platinum as conductive material.

10. A method (300) for manufacturing the analyte sensor according to any one of the previous claims for use in medical devices for measuring analyte data in an analyte carrying fluid, in particular for measuring glucose data, comprising:

    mounting (301) a sensor circuit comprising a first electrode and a second electrode onto a substrate, the first electrode being a working electrode,

    applying (302) at least at one membrane comprising a membrane material that is impermeable to the analyte carrying fluid and/or the analyte,

    covering at least partially the first electrode with the at least one membrane, and

    forming at least one opening in the membrane, for example by a drilling and/or ablation process, e.g. by laser ablation.

11. The method according to claim 10, further comprising:

    filling, at least partially the least one opening in the membrane with a material (103) that is permeable to the analyte carrying fluid and/or permeable to the analyte.

12. An analyte sensor for use in medical devices for measuring analyte data in an analyte carrying fluid, in particular for measuring glucose data, comprising:

a first electrode (101) being a working electrode,

a second electrode, and

a substrate (100) carrying the first electrode and the second electrode,

wherein the first electrode comprises a material that is impermeable to the analyte carrying fluid and/or impermeable to the analyte, and wherein first electrode comprises at least one opening, and wherein the first electrode is configured for controlling the flux of the analyte carrying fluid and/or the analyte to an electrochemical active layer of the first electrode via the at least one opening.

13. A method (400) for operating the analyte sensor according to one of the preceding analyte sensor claims 1 to 9 and 12, comprising:

applying (401) a voltage signal between the first electrode and the second electrode,

integrating (402) an electrical signal, e.g. an electrical current, between the first electrode and the second electrode via at least one capacitor, wherein said electrical signal was generated in response to an electrochemical reaction of the first electrode with an analyte or analyte carrying fluid, said integration generating a voltage signal that is proportional to the charge of the at least one capacitor, and

measuring (403) analyte data based on the generated voltage signal.

14. The method (400) according to claim 13, wherein the electrodes are operated periodically in an open circuit mode.

15. A continuous analyte monitoring system, e.g. a continuous glucose monitoring system, comprising:

a medical device comprising the analyte sensor according to one of the preceding analyte sensor claims, and one or more processors configured for processing data collected by the analyte sensor.

16. A kit comprising:

at least one analyte sensor according to one of the preceding analyte sensor claims, and

at least one mounting unit, e.g. a patch unit, configured for the placement of the at least one analyte sensor on the skin of a user and to which the at least one analyte sensor can be detachably coupled.