Patent Claims

1. A Microbial Electrolysis Cell (MEC) for use in a bio-electromethanogenesis plant comprising one gas inlet for an input gas and two or more degassing elements or comprising two or more gas inlet for an input gas and one or more degassing elements.

2. MEC stack (1) in a bio-electromethanogenesis plant comprising:

at least two MEC cells according to claim 1 (10a, 10b),

wherein each MEC cell (10a, 10b) comprises a cathode compartment (12a, 12b) and an anode compartment (14a, 14b);

wherein the MEC cells (10a, 10b) are fluidly connected parallelly or in series; and

wherein the MEC stack comprises at least one catholyte circuit (18), connecting the cathode compartments (12a, 12b) of two or more MEC cells (10a, 10b) of the MEC stack.

characterized in that

two or more gas inlets (22a, 22b) are located within the at least one catholyte circuit (18).

3. MEC stack (1) according to claim 2, comprising at least one gas inlet (22a, 22b) at one or more individual MEC cells (10a, 10b) of the MEC stack (1).

4. MEC stack (1) according to claim 3 comprising at least one gas inlet (22a, 22b) within the cathode compartment (12a, 12b) of the one or more individual MEC cells (10a, 10b).

5. MEC stack (1) according to any of claims claim 2-4, wherein each gas inlet (22a, 22b) comprises a respective flow controller to selectively regulate the gas input from the gas source (20a, 20b).

6. MEC stack according to any of claims 2-5, wherein the MEC stack (1) comprises at least one de-gassing element (30) to extract at least a first gas /one of the process gases from the MEC stack (1), wherein one of the de-gassing elements (30) is located after a last MEC cell of the MEC stack.

7. MEC stack according to claim 6 wherein one or more de-gassing element are located after one or more of the other MEC cells.

8. MEC stack (1) according to any of the claims 2-5 comprising at least one device selected from of a pH measuring system (32), a ORP measuring system (34), a temperature measuring system, a volume measuring system, a current measuring system.

9. MEC stack (1) according to claim 8 wherein the pH measuring system and/or the ORP measuring system and/or the temperature measuring system and/or the volume measuring system and/or the current measuring system are located before and/or after at least one gas inlet (22a, 22b).

10. A MEC stack (1) in a bio-electromethanogenesis plant comprising:

at least two MEC cells according to claim 1 (10a, 10b),

wherein each MEC cell (10a, 10b) comprises a cathode compartment (12a, 12b) and an anode compartment (14a, 14b);

wherein the MEC cells (10a, 10b) are fluidly connected parallelly or in series; and

wherein the MEC stack comprises at least one catholyte circuit (18) for catholyte, connecting the cathode compartments (12a, 12b) of two or more MEC cells (10a, 10b) of the MEC stack.

the MEC stack (1) comprising one gas inlet (22a) for an input gas located at a first MEC cell (10a) of the MEC stack

characterized in that

the MEC stack (1) comprises at least two de-gassing elements (30a, 30b) for extracting at least one output gas, one of de-gassing element (30a, 30b) being located after a last MEC cell (10b) of the MEC stack (1).

11. The MEC stack (1) according to claim 10 wherein at least one de-gassing element (30a, 30b) is located after one or more of the other MEC cells.

12. A MEC module (100) comprising two or more MEC stacks (10a, 10b) according to any of the above claims 2-11, the two or more MEC stacks (10a, 10b) being fluidly connected through the catholyte circuit (18).

13. Method to regulate the gas gradient in a bio-electromethanogenesis process in a Microbial Electrolysis cell (MEC)-stack comprising at least two MEC cells, the method comprising the steps of

a. Measuring in the cathode compartments the stack current and/or voltage of the MEC and/or MEC-stack;

b. Determine an input gas quantity for at least one gas inlet point based on the information assessed in step a);

c. Feeding the determined input gas quantity through at least one gas inlet point, thereby regulating the volumetric requirement for efficient methane production in the system and

d. De-gassing the MEC stack through one or more degassing element located after a MEC cell of the MEC stack.

14. Method according to claim 1~~2~~3, wherein step a) further comprises measuring at least one of:

(i) the pH value of the catholyte in the catholyte circuit,

(ii) the oxidation reduction potential of the catholyte

(iii) the temperature of the catholyte

thereby regulating in step c) the pH value and/or the temperature and/or the oxidation potential of the catholyte

15. Method according to claim ~~2~~13, wherein step a) comprises measuring the pH value of the catholyte through a pH measuring system located before and/or after the two or more gas inlets points.