CLAIMS

1. An electrode system (1) comprising:

a plurality of first electrode plates (3; 3'; 3") and a plurality of second electrode plates (5; 5') arranged alternatingly to form an electrode stack,

each first electrode plate (3; 3'; 3") having a first electrode plate first busbar opening (25a; 25a'; 25a") and a first electrode plate second busbar opening (25b; 25b'; 25b") extending through the first electrode plate (3; 3'; 3"), the first electrode plate second busbar opening (25b; 25b'; 25b") being larger than the first electrode plate first busbar opening (25a; 25a'; 25a"),

each second electrode plate (5; 5') having a second electrode plate first busbar opening (27a; 27a') extending through the second electrode plate (5; 5'), the second electrode plate first busbar opening (27a; 27a') being dimensioned larger than each of the first electrode plate first busbar openings (25a; 25a'; 25a") and aligned with the first electrode plate first busbar openings (25a; 25a'; 25a"), and a second electrode plate second busbar opening (27b; 27b') extending through the second electrode plate (5; 5'), the second electrode plate second busbar opening (27b; 27b') being dimensioned smaller than each of the first electrode plate second busbar openings (25b; 25b'; 25b") and aligned with the first electrode plate second busbar openings (25b; 25b'; 25b"),

a first busbar (17a; 18; 31; 45) extending through the first electrode plate first busbar openings (25a; 25a'; 25a") and the second electrode plate first busbar openings (27a; 27b'), the first busbar (17a; 18; 31; 45) being configured to be in mechanical contact with an inner first busbar surface of the first electrode plate first busbar openings (25a; 25a'; 25a") only, and

a second busbar (17b) extending through the first electrode plate second busbar openings (25b; 25b'; 25b") and the second electrode plate second busbar openings (27b; 27b'), the second busbar (17b) being configured to be

in mechanical contact with an inner second busbar surface of the second electrode plate second busbar openings (27b; 27b') only,

wherein the first electrode plates have an electrically conductive first frame which delimits a respective first inner volume and the second electrode plates have an electrically conductive second frame which delimits a respective second inner volume, the frames being coated with a heat conductive polymer, wherein the first electrode plates and second electrode plates have an exposed region where the underlying metal core has been exposed,

the exposed region of the first electrode plates being provided with the first electrode plate first busbar opening and the first busbar second busbar opening,

the exposed region of the second electrode plates being provided with the second electrode plate first busbar opening and the second busbar second busbar opening, and

a plurality of electrically conducting spacers (41a, 41b), each having a through-opening receiving a first or a second busbar, wherein for each of the first electrode plates and the second electrode plates respective two spacers are arranged in electrical connection with the exposed region, one spacer being arranged on one side of the corresponding first electrode plate first busbar opening or second electrode plate second busbar opening and another spacer being arranged on the opposite side thereof, wherein both the front and the rear surfaces of the exposed regions (39) are in mechanical and electrical contact with a respective spacer.

2. The electrode system (1) as claimed in claim 1, wherein the first busbar is an anode busbar and the second busbar is a cathode busbar.

3. The electrode system (1) as claimed in claim 1 or 2, wherein every first electrode plate (3; 3'; 3") is an anode and every second electrode plate (5; 5') is a cathode.

4. The electrode system (1) as claimed in any of the preceding claims, wherein the first frames have (19a) a first oxygen gas channel (24a), a first hydrogen gas channel (24b), wherein of the first oxygen gas channel (24a) and the first hydrogen gas channel (24b) only the first oxygen gas channel (24a) is connected to the first inner volume (21a), and a water channel (22a) connected to the first inner volume (21a).

5. The electrode system (1) as claimed in claim 4, wherein the second frames (19b) have a second oxygen gas channel (26a) aligned with the first oxygen gas channels (26a), a second hydrogen gas channel (26b) aligned with the first hydrogen gas channels (24a), wherein of the second oxygen gas channel (26a) and the second hydrogen gas channel (26b) only the second hydrogen gas channel (26b) is connected to the second inner volume (21b), and a second water channel (28a) aligned with the water channel (22a).

6. The electrode system (1) as claimed in any of the preceding claims, wherein the first busbar (17a; 18; 31; 45) is configured to engage with the inner first busbar surfaces and the second busbar (17b) is configured to engage with the inner second busbar surfaces.

7. The electrode system (1) as claimed in any of the preceding claims, wherein the inner first busbar surfaces are threaded and the first busbar (17a) is provided with external threads configured to form a threaded connection with the threads of the inner first busbar surfaces, and the inner second busbar surfaces are threaded and the second busbar (17b) is provided with external threads configured to form a threaded connection with the threads of the inner second busbar surfaces.

8. The electrode system (1) as claimed in claim 7, wherein the first busbar (17a; 18; 31) and the second busbar (17b) have a circular cross section.

9. The electrode system (1) as claimed in any of the preceding claims, wherein the electrode system (1) is an electrolyser system.

10. An electrode system (1) comprising:

a plurality of first electrode plates (3; 3’; 3”) and a plurality of second electrode plates (5; 5’) arranged alternatingly to form an electrode stack,

each first electrode plate (3; 3’; 3”) having a first electrode plate first busbar opening (25a; 25a’; 25a”) and a first electrode plate second busbar opening (25b; 25b’; 25b”) extending through the first electrode plate (3; 3’; 3”), the first electrode plate second busbar opening (25b; 25b’; 25b”) being larger than the first electrode plate first busbar opening (25a; 25a’; 25a”),

each second electrode plate (5; 5’) having a second electrode plate first busbar opening (27a; 27a’) extending through the second electrode plate (5; 5’), the second electrode plate first busbar opening (27a; 27a’) being dimensioned larger than each of the first electrode plate first busbar openings (25a; 25a’; 25a”) and aligned with the first electrode plate first busbar openings (25a; 25a’; 25a”), and a second electrode plate second busbar opening (27b; 27b’) extending through the second electrode plate (5; 5’), the second electrode plate second busbar opening (27b; 27b’) being dimensioned smaller than each of the first electrode plate second busbar openings (25b; 25b’; 25b”) and aligned with the first electrode plate second busbar openings (25b; 25b’; 25b”),

a first busbar (17a; 18; 31; 45) extending through the first electrode plate first busbar openings (25a; 25a’; 25a”) and the second electrode plate first busbar openings (27a; 27b’), the first busbar (17a; 18; 31; 45) being configured to be in mechanical contact with an inner first busbar surface of the first electrode plate first busbar openings (25a; 25a’; 25a”) only, and

a second busbar (17b) extending through the first electrode plate second busbar openings (25b; 25b’; 25b”) and the second electrode plate second busbar openings (27b; 27b’), the second busbar (17b) being configured to be in mechanical contact with an inner second busbar surface of the second electrode plate second busbar openings (27b; 27b’) only,

wherein the first busbar (18) is provided with a plurality of radially outwards extending first fins (18a), the first fins (18a) being provided with a respective first fin locking structure (18b), and the inner first busbar surface is provided with a plurality of radially inwards extending first protrusions (29) each provided with an inner first locking structure (29a), each inner first locking structure (29a) being configured to mate with a respective first fin locking structure (18b).

11. The electrode system (1) as claimed in claim 10, wherein the first fin locking structures (18b) are tangential protrusions configured to snap-fit with a respective inner first locking structure (29a).

12. The electrode system (1) as claimed in claim 10 or 11, wherein the second busbar is provided with a plurality of radially outwards extending second fins, the second fins being provided with a respective second fin locking structure, and the inner second busbar surface is provided with a plurality of radially inwards extending second protrusions each provided with an inner second locking structure, each inner second locking structure being configured to mate with a respective second fin locking structure.

13. The electrode system (1) as claimed in claim 12, wherein the second fin locking structures are tangential protrusions configured to snap-fit with a respective inner second locking structure.