CLAIMS

1. Electrochemical device of the battery type comprising

- a so-called unit stack (2) formed by at least one unit cell, each unit cell successively comprising at least one anode current-collecting substrate, at least one anode layer, at least one layer of an electrolyte material or of a separator impregnated with an electrolyte, at least one cathode layer, and at least one cathode current-collecting substrate,

said unit stack defining six faces, i.e. two so-called frontal faces (21 and 22) opposite one another, generally parallel to the anode, electrolyte material and cathode layers, as well as four so-called lateral faces (23 to 26) opposite one another in pairs, in particular parallel to one another in pairs,

- anode contact means (30),
- cathode contact means (40),
- impervious sealing means (7), which are capable of protecting said stack, wherein the impervious sealing means comprise an encapsulation system (7), the encapsulation system (7) having a water vapour permeance (WVTR) of less than $10^{-5}g/m^2.d$,

the device further comprising

- an electrical connection support (5), made at least in part of a conductive material, provided near a first frontal face (21) of said unit stack,
- electrical insulation means (53, 54), enabling two distant regions (56, 57) of said electrical connection support (5) to be insulated from one another,

the anode contact means (30) allowing a first lateral face (23) of said unit stack to be electrically connected to the electrical connection support (5), and

the cathode contact means (40) allowing a second lateral face (24) of said unit stack, opposite said first lateral face (23), to be electrically connected to said electrical connection support (5).

2. Device according to the preceding claim, wherein said encapsulation system (7) covers the other frontal face (22) of said unit stack, the anode contact means, the cathode contact means, and at least in part the face (51) of said electrical connection support (5) that is facing said unit stack.

3. Device according to claim 1 or 2, wherein said encapsulation system covers the opposite frontal faces of said unit stack, as well as the lateral faces of said stack which are not covered by the anode and cathode contact means,

said encapsulation system further occupying, , all or part of the electrical insulation means (53, 54), as well as the intermediate space separating the support from said first frontal face of the unit stack.

4. Device according to one of the preceding claims, wherein the impervious sealing means comprise said anode contact means and/or said cathode contact means.

5. Device according to claim 4, wherein the impervious sealing means comprise, on the one hand, the contact means covering two first lateral faces of the stack and, on the other hand, the encapsulation system covering the other two lateral faces of the stack as well as the two frontal faces of the stack.

6. Device according to one of claims 2 to 5, further comprising a mechanical stiffening system (8), covering the encapsulation system opposite the electrical connection support (5).

7. Device according to one of the preceding claims, wherein the electrical connection support is of the single-layer type, in particular a metal grid or a silicon interlayer.

8. Device according to the preceding claim, wherein the electrical insulation means comprise one or more free spaces made in said electrical connection support of the single-layer type, these free spaces being capable of being empty or filled with an electrically-insulating material, the distant connection regions of said electrical connection support being placed on either side of these free spaces.

9. Device according to the preceding claim, wherein the electrical connection support comprises a single free space, on either side whereof the distant connection regions are provided.

10. Device according to claim 8, wherein the electrical connection support comprises two free spaces, between which a central base plate of said electrical connection support is provided.

11. Device according to one of claims 1 to 6, wherein the electrical connection support is of the multilayer type and comprises a plurality of layers disposed one below the other, this support being in particular of the printed circuit board type.

12. Device according to the preceding claim, wherein each layer of the multi-layer support comprises at least one conductive zone and at least one insulating zone, the conductive zones of the different layers forming electrical connection paths capable of connecting the anode and cathode contact means respectively to the face of the support, which is opposite the stack, whereas said insulating zones form said electrical insulation means.

13. Device according to one of claims 2 to 12, wherein the encapsulation system is selected from among:

- a dense inorganic film deposited by a technique selected from among ALD, PECVD or HDPCVD, with a total thickness of less than 5 µm and preferably less than 2 µm, or
- a succession of inorganic films with a total thickness of less than 5 µm, preferably less than 2 µm, or
- a succession of organic and inorganic films with a total thickness of less than 20 µm, preferably less than 10 µm.

14. Device according to one of claims 6 to 13, wherein the mechanical stiffening system is selected from among:

- a resin, which can consist of a simple polymer or a polymer having a polymer matrix, which is preferably an epoxy or acrylate polymer, and a mineral filler, which can consist of particles, flakes or glass fibres;
- a low melting point glass, preferably chosen from the group formed by: SiO_2-B_2O_3 glasses; Bi_2O_3-B_2O_3 glasses, ZnO-Bi_2O_3-B_2O_3 glasses, TeO_2-V_2O_5 glasses, and PbO-SiO_2, glasses;
- a film produced by rolling.

15. Device according to one of the preceding claims, further comprising rigid connection means (6), enabling one (21) of the frontal faces of the unit stack to be rigidly connected to said electrical connection support (5).

16. Device according to the preceding claim, wherein the rigid connection means comprise a layer of a non-conductive adhesive (6).

17. Device according to one of the preceding claims, wherein the anode or cathode electrical contact means comprise a conductive adhesive.

18. Device according to one of the preceding claims, wherein the anode or cathode electrical contact means comprise a metal foil.

19. Method of manufacturing an electrochemical device of the battery type according to one of the preceding claims,
said method comprising:

- placing the electrical connection support (5) near the first frontal face (12) of said unit stack,
- insulating the two distant regions (56, 57) of said electrical connection support (5) from one another,
- electrically connecting the first lateral face (23) of said unit stack to the electrical connection support (5),
- electrically connecting the second lateral face (24) of said unit stack, opposite said first lateral face, to said electrical connection support (5),
- coating the impervious sealing means.

20. Method according to the preceding claim, wherein the impervious sealing means are coated after the electrical connection support has been placed near the first frontal face of the unit stack.

21. Method according to claim 19, wherein at least part of the impervious sealing means is coated before the electrical connection support is placed near the first frontal face of the unit stack.

22. Method according to the preceding claim, wherein at least one first layer of the impervious sealing means is coated before the electrical connection support is placed near the first frontal face of the unit stack, then at least one second layer of the impervious sealing means is coated after said electrical connection support has been placed near said first frontal face.

23. Method according to one of claims 19 to 22, further comprising

- supplying a frame (105) intended to form a plurality of supports (5)
- placing said frame near the first frontal face of a plurality of unit stacks, these stacks being arranged in a plurality of lines and/or a plurality of rows
- making at least one cut, in particular a plurality of cuts in the longitudinal direction and/or lateral direction of these stacks, so as to form a plurality of electrochemical devices.

24. Electric energy-consuming device (1000) comprising a body (1002) and an electrochemical device (1) according to one of claims 1 to 18, said electrochemical device being capable of supplying electric energy to said electric energy-consuming device, and said electrical connection support (5) of said electrochemical device being fastened to said body.