ions, to apply the strip to the whole of the surface of the positive electrode; in other words, the ratio between the geometric surface area of the lithium strip and the cumulative geometric surface area of the positive electrodes must not be too low and must ideally tend toward 1 (when the whole surface of the positive electrodes is covered by the lithium strip). The thickness of the strip used in the example of US 5 871 863 is 30 μm.

The Applicant, in the context of its research aiming to perfect lithium-ion accumulators comprising nanostructured electrodes as described in FR 2 901 641, has found that, by virtue of the textile structure of the negative electrodes and by virtue of a particular arrangement of the various components of the accumulator, it was possible to use metallic lithium as a source of lithium in order to compensate for the reduction in capacity observed or desired at the end of the first charge/discharge cycle, in a way which is much simpler than in the above-discussed patent US 5 871 863.

The reason is that in the accumulator precursor of the present invention, described in detail hereinafter, the fact that the textile structure of the nanostructured negative electrodes, even when they are stacked on one another or wound around each other, allows the passage of lithium ions in all directions, and especially in a direction perpendicular to the plane of the textile electrodes, is exploited. The result is a regular diffusion of the lithium ions throughout the accumulator and/or accumulator precursor.

In embodiments of the present invention, therefore, it is unnecessary to apply a lithium strip to each of the

lithium-receiving electrodes (as in US 5 871 863); instead, a single lithium strip, or a small number of strips, with a thickness that is relatively greater, is sufficient to introduce the desired amount of lithium in a regular way into all of the negative electrodes receiving lithium ions.

Embodiments of t~~T~~he present invention accordingly seek to provide~~s~~ a lithium-ion accumulator precursor comprising not only one or more superposed nanostructured textile electrodes but also at least one sacrificial lithium electrode, in other words an electrode made of lithium or lithium alloy that will be partly or entirely consumed during the production of the definitive accumulator (first charge) from the accumulator precursor.

According to an aspect, there is provided a lithium-ion~~The~~ accumulator precursor ~~of the present invention~~ comprise~~s~~ing

- one or more electrode modules each formed by

(a) at least one textile negative electrode precursor, composed of a textile metallic structure, oxidized at the surface, based on one or more transition metals from groups 4 to 12 of the Periodic Table of the Elements,

(b) a polymeric separator, impregnated with a solution of a lithium salt in an aprotic organic solvent, said separator covering the entire surface of the textile negative electrode precursor (a),

(c) a positive electrode forming a solid, preferably continuous, matrix which encloses the structure formed by (a) and (b), and

- at least one metallic lithium electrode, preferably formed by a metallic lithium strip supported by an electrical conductor, and separated from the electrode module or modules by a polymeric separator impregnated

which they react, in a partially irreversible way, to form the nanostructured conversion layer which constitutes the active material of the final negative electrode;

- a second step of electrochemical reduction by the positive electrode. In the course of this step, the lithium ions from the positive electrode migrate through the separator of the negative electrode, and insert themselves reversibly into the nanostructured conversion layer formed during the preceding step.

~~AThe present invention a~~accordingly to another aspect, there is provided a method for manufacturing a lithium-ion accumulator from a lithium-ion accumulator precursor as described above, said method comprising:

(i) a step of electrochemically reducing the negative electrode precursor or precursors by the lithium electrode, this step comprising the application of a potential or a current between the negative electrode and the lithium electrode and effecting the partial or total consumption of the lithium electrode, until the surface oxide layer of the negative electrode precursor or precursors has been transformed, partially or completely, into a nanostructured conversion layer, and

(ii) a step of electrochemically reducing the precursor of the negative electrode by the positive electrode of the accumulator precursor, this step comprising the passage of a current from the positive electrode to the negative electrode until the positive electrode is entirely charged,

these two steps being able to be carried out in this order, but also in the reverse order; that is, the step of reducing the precursor of the negative electrode by

CLAIMS

1. A lithium-ion accumulator precursor comprising

- one or more electrode modules ~~(1)~~ each formed by

(a) at least one textile negative electrode precursor ~~(2)~~, composed of a textile metallic structure ~~(4)~~, oxidized at the surface ~~(5)~~, based on one or more transition metals from groups 4 to 12 of the Periodic Table of the Elements,

(b) a polymeric separator ~~(6)~~, impregnated with a solution of a lithium salt in an aprotic organic solvent, said separator covering the entire surface of the textile negative electrode precursor,

(c) a positive electrode ~~(3)~~ forming a solid, preferably continuous, matrix which encloses the structure formed by (a) and (b), and

- at least one metallic lithium electrode, formed by a metallic lithium strip ~~(9)~~ supported by an electrical conductor ~~(10)~~, and separated from the electrode module or modules by a polymeric separator ~~(11)~~ impregnated with a solution of a lithium salt in an aprotic organic solvent,

characterized in that the ratio of the geometric surface area of the lithium strip to the cumulative geometric surface area of all of the textile negative electrode precursors is within the range from 0.05 to 0.33, preferably from 0.1 to 0.25.

2. The accumulator precursor as claimed in claim 1, characterized in that the surface-oxidized metallic textile structure is a non-woven structure formed of short fibers preferably having an average length of between 1 cm and 50 cm, preferably between 2 cm

and 20 cm, and an equivalent diameter of between 5 μm and 50 μm.

3. The accumulator precursor as claimed in claim 1 or 2, characterized in that the textile metallic structure is made of unalloyed or low-alloy steel.

4. The accumulator precursor as claimed in any of the preceding claims, characterized in that a plurality of plane-shaped electrode modules of identical dimensions are superposed in parallel with one another.

5. The accumulator precursor as claimed in any of the preceding claims, characterized in that the plane of the lithium strip of the lithium electrode is parallel to the plane of the electrode module or modules.

6. The accumulator precursor as claimed in any of the preceding claims, characterized in that it further comprises an electron collector ~~(e)~~, in electrical contact with the positive electrode (c) of each of the electrode modules, said electron collector being formed preferably by one or more aluminum grids arranged parallel to the plane of the electrode module or modules and intercalated between them.

7. A method for producing a lithium-ion accumulator from a lithium-ion accumulator precursor as claimed in any of the preceding claims, comprising

(i) a step of electrochemically reducing the negative electrode precursor or precursors by the sacrificial metallic lithium electrode, this step comprising the application of a potential or a current between the negative electrode and the lithium electrode and leading to the partial or total consumption of the sacrificial metallic lithium electrode, until the superficial oxide layer of the negative electrode precursors has been