Claims

1. A method for preparing a single-domain thin layer (4) of lithium-containing ferroelectric material, the method comprising:

- providing a first single-domain layer (8) of lithium-containing ferroelectric material, said layer being bonded to a carrier (2), the first layer (8) having a lithium-rich surface thickness (11); and

- finishing the first layer (8), this finishing comprising heat treatment of the free side (9) of the first layer (8), followed by a step of thinning the first layer to form the single-domain thin layer (4);

wherein the method comprises, prior to the heat treatment:

- a first step of wet cleaning of the free side (9) of the first layer (8), the cleaning step being able to remove the lithium-rich surface layer; and

- a second step of preparing the first layer (8) to eliminate, prevent, or limit the appearance of lithium-rich and hydrogen-rich dendrites (12) liable to nucleate on the free side (9) of the first layer (8) when it is devoid of the lithium-rich surface layer.

2. The method according to the preceding claim, wherein providing the first layer (8) comprises:

- implanting light species in a first face (6) of a lithium-containing ferroelectric donor substrate (5) to form an embrittlement plane (7) and define the first layer (8) between the embrittlement plane (7) and the first face (6) of the donor substrate (5);

- assembling the first face (6) of the donor substrate (5) to the carrier (2) by means of a dielectric interlayer (3); and

- fracturing the donor substrate (5) at the embrittlement plane (7) in order to transfer the first layer (8) onto the support substrate (2) and expose a free side (9) of the first layer (8) to the atmosphere, this exposure leading to the formation of the lithium-rich surface thickness (11).

3. The method according to one of the preceding claims, wherein the first cleaning step comprises brushing and dispensing deionized water onto the free side (9) of the first layer (8).

4. The method according to one of the preceding claims, wherein the second preparation step is a wet cleaning step of the free side (9) of the first layer (8).

5. The method according to claim 4, wherein the second cleaning step comprises brushing and dispensing deionized water onto the free side (9) of the first layer (8).

6. The method according to one of the preceding claims, wherein the second preparation step is designed to remove dendrites (12) and is applied at least 50 hours, preferably at least 75 hours, after the application of the first cleaning step.

7. The method according to one of claims 1 to 5 comprising an intermediate step, between the first preparation step and the second preparation step, the intermediate step exposing the first layer (8) to a temperature above ambient temperature.

8. The method according to one of claims 1 to 3, wherein the second preparation step is designed to prevent or limit the appearance of dendrites (12) and is applied less than 50 hours, preferably less than 10 hours, after the application of the first cleaning step.

9. The method according to claim 8, wherein the second preparation step comprises exposing the free side (9) of the first layer to a plasma.

10. The method according to claim 9, wherein the plasma is selected from the list formed by an O2 plasma, an N2 plasma and a fluorine-based plasma, such as an SF6 or CxHyFz plasma, or a combination of these plasmas.

11. The method according to one of the preceding claims, wherein the support (2) is formed by a single-piece electrically conductive or semiconductive substrate.

12. The method according to one of claims 1 to 9, wherein the support (2) comprises a base substrate (2a) and a trapping layer (2b), the trapping layer (2b) being arranged between the dielectric interlayer (3) and the base substrate (2a).

13. The method according to one of the preceding claims, wherein the first layer (8) and the thin layer (4) consist of a single-crystal piezoelectric material, such as lithium tantalate or lithium niobate.

14. The method according to claim 13, wherein the first layer (8) and the thin layer (4) consist of lithium niobate.

15. The method according to one of the preceding claims, wherein the dielectric interlayer (3) comprises at least one layer of silicon oxide, silicon oxynitride, or silicon nitride.