BRIEF DESCRIPTION OF THE INVENTION

An aspect of the invention relates to a structure for radiofrequency applications comprising:

a support substrate of high-resistivity silicon comprising a non-doped lower part and a p-type doped upper part, the p-typed doped upper part formed to a depth D of less than 1 µm in the support substrate; and

a mesoporous trapping layer of silicon formed in the p-type doped upper part of the support substrate, the mesoporous trapping layer having a porosity rate of between 20% and 60% such that the mesoporous trapping layer traps inversion charges susceptible to be generated in the non-doped lower part and the non-doped lower part retains a high and stable resistivity level.

The porosity rate of the trapping layer thus obtained makes it possible to accurately control its resistivity, at levels that can be high (> 5000 ohm.cm). Thus, the setting of the porosity rate (according to a precise range from 20% to 60%) and of the depth D (less than 1 µm) of the doping of the upper part of the support substrate of silicon in which the trapping layer will be formed, make it possible:

- to ensure a good mechanical strength of the mesoporous layer, allowing it to be retained in the final functional device;
- and to confer properties of resistivity and of insulation on the structure that are appropriate for radiofrequency applications.

Moreover, the fabrication of a very thin mesoporous trapping layer (less than 1 µm) simplifies the step of deposition of the trapping layer on the support substrate, as well as the potential steps of surface preparation necessary for the subsequent process steps to be carried out.

According to advantageous features of the invention, taken alone or in combination:

CLAIMS

1. A structure for radiofrequency applications comprising:

a support substrate of high-resistivity silicon comprising a non-doped lower part and a p-type doped upper part, the p-typed doped upper part formed to a depth D of less than 1 µm in the support substrate; and

a mesoporous trapping layer of silicon formed in the p-type doped upper part of the support substrate, the mesoporous trapping layer having a porosity rate of between 20% and 60% such that the mesoporous trapping layer traps inversion charges susceptible to be generated in the non-doped lower part and the non-doped lower part retains a high and stable resistivity level.

2. The structure of claim 1, wherein the mesoporous trapping layer has pores with a diameter of between 2 nm and 50 nm.

3. The structure of claim 2, wherein the resistivity of the non-doped lower part of the support substrate is greater than 1000 ohm.cm.

4. The structure of claim 1, wherein an active layer is disposed over the mesoporous trapping layer.

5. The structure of claim 4, wherein the active layer compromises a semiconductive material.

6. The structure of claim 4, wherein the active layer compromises a piezoelectric material.

7. The structure of claim 4, wherein the active layer comprises at least one material selected from the group consisting of:

silicon, silicon carbide, silicon germanium, lithium niobate, lithium tantalate, quartz, and aluminum nitride.

8. The structure of claim 4, wherein the thickness of the active layer is between 10 nm and 50 µm.

9. The structure of claim 4, wherein a dielectric layer is disposed between the mesoporous trapping layer and the active layer.

10. The structure of claim 9, wherein the dielectric layer comprises at least one material selected from the group consisting of: silicon dioxide, silicon nitride, and aluminum oxide.

11. The structure of claim 10, wherein the dielectric layer is between 10 nm and 6 µm.

12. The structure of claim 4, wherein at least one microelectronic device is present on or in the active layer, the microelectronic device being a switching circuit or an antenna tuning circuit or a radiofrequency power amplification circuit.

13. The structure of claim 4, wherein at least one microelectronic device is present on or in the active layer, the microelectronic device comprising a plurality of active components and a plurality of passive components.

14. The structure of claim 4, wherein at least one microelectronic device is present on or in the active layer, the microelectronic device comprising at least one control element and one MEMS switching element comprising a microswitch with ohmic contact or a capacitive micro-switch.

15. The structure of claim 4, wherein at least one microelectronic device is present on or in the active layer, the microelectronic device comprising a radiofrequency filter operating by bulk or surface acoustic wave propagation.

16. The structure of claim 1, wherein the resistivity of the non-doped lower part of the support substrate is greater than 1000 ohm.cm.

17. The structure of claim 1, wherein an active layer is arranged on the mesoporous trapping layer.

18. The structure of claim 9, wherein the dielectric layer is between 10 nm and 6 µm.