art in "Silicon-on-insulator (SOI) Technology, manufacture and applications", points 10.7 and 10.8, Oleg Kononchuk and Bich-Yen Nguyen, from Woodhead Publishing.

Nevertheless, these substrates fail to fulfil the most stringent specifications: for example, when localised heating beyond approximately 80°C occurs, the resistivity of these substrates declines owing to generation of heat carriers in the substrate and device/substrate coupling once again becomes a major contributor to attenuation and distortion of the signal and interference among components. Deteriorations in performance are also observed when the temperature falls to below 0°C.

Embodiments of the invention seek to provide a suitable structure for radiofrequency applications, solving the drawbacks of the prior art. Embodiments of the invention seek to provide an integrated structure delivering radiofrequency performances, particularly with the range of temperatures of use.

BRIEF DESCRIPTION OF THE INVENTION

According to an aspect of the invention, there is provided a structure for radiofrequency applications comprising:

- a semiconducting supporting substrate; and
- a trapping layer arranged on the supporting substrate, the trapping layer comprising polycrystalline silicon including 1% to 20% of carbon;

wherein the trapping layer comprises a defect density greater than a predetermined defect density; the predetermined defect density is the defect density for which the electrical

resistivity of the trapping layer is greater than or equal to 10kohm.cm over a temperature range extending from -20 °C to 120°C.

The structure for radiofrequency applications according to embodiments of the invention may display temperature-stable electrical properties, ensuring good stability and repeatability of the RF performances within the range of temperatures of use.

According to advantageous characteristics according to embodiments of the invention, taken either separately or in combination:

- the trapping layer has a resistivity at 20°C greater than 10 kOhm.cm and preferably greater than 50 kOhm.cm;

- the difference in the thermal expansion coefficient between the trapping layer and the supporting substrate is less than 5 ppm/k between 100°C and 1200°C;

- the trapping layer comprises microstructures of a size smaller than 20 nm and preferably smaller than 10 nm;

- the trapping layer comprises a porous or polycrystalline material;

- the trapping layer comprises polycrystalline silicon containing 1 to 20% of carbon;

- the thickness of the trapping layer is between 10 and 50 µm and preferably between 20 and 30 µm;

- the supporting substrate comprises at least one of the materials selected from the following group: silicon, silicon germanium and silicon carbide;

- the resistivity of the supporting substrate is between 10 and 2000 Ohm.cm.

CLAIMS

1. A structure for radiofrequency applications, comprising:

a semiconducting supporting substrate; and

a trapping layer arranged on the supporting substrate, the trapping layer comprising polycrystalline silicon including 1% to 20% of carbon;

wherein the trapping layer comprises a defect density greater than a predetermined defect density, the predetermined defect density being the defect density for which the electrical resistivity of the trapping layer is greater than or equal to 10,000 ohm·cm over a temperature range extending from −20° C. to 120° C.

2. The structure for radiofrequency applications according to claim 1, wherein the trapping layer has a resistivity, at 20° C., of greater than 10,000 ohm·cm.

3. The structure for radiofrequency applications according to claim 2, wherein the trapping layer has a resistivity, at 20° C., of greater than 50,000 ohm·cm.

4. The structure for radiofrequency applications according to claim 1, wherein a difference in thermal expansion coefficient between the trapping layer and the supporting substrate is less than 5 ppm/K between 100° C. and 1200° C.

5. The structure for radiofrequency applications according to claim 1, wherein the trapping layer comprises microstructures of a size smaller than 20 nm.

6. The structure for radiofrequency applications according to claim 1, wherein the trapping layer comprises a porous or polycrystalline material.

7. The structure for radiofrequency applications according to claim 1, wherein a thickness of the trapping layer is between 10 μm and 50 μm.

8. The structure for radiofrequency applications according to claim 1, wherein the supporting substrate comprises at least one material selected from the group consisting of: silicon, silicon germanium, and silicon carbide.

9. The structure for radiofrequency applications according to claim 1, wherein a resistivity of the supporting substrate is between 10 ohm·cm and 2000 ohm·cm.

10. The structure for radiofrequency applications according to claim 1, wherein an active layer is disposed on the trapping layer.

11. The structure for radiofrequency applications according to claim 10, wherein the active layer comprises a semiconductor material.

12. The structure for radiofrequency applications according to claim 10, wherein the active layer comprises a piezoelectric material.

13. The structure for radiofrequency applications according to claim 10, wherein a thickness of the active layer is between 10 μm and 50 μm.

14. The structure for radiofrequency applications according to claim 10, wherein a dielectric layer is disposed between the trapping layer and the active layer.

15. The structure for radiofrequency applications according to claim 14, wherein the dielectric layer has a thickness between 10 nm and 6 µm.

16. The structure for radiofrequency applications according to claim 10, further comprising at least one microelectronic device on or in the active layer, wherein the at least one microelectronic device comprises a switching circuit, an antenna adaptation circuit, or a radiofrequency power amplification circuit.

17. The structure for radiofrequency applications according to claim 10, further comprising at least one microelectronic device on or in the active layer, wherein the at least one microelectronic device comprises a plurality of active components and a plurality of passive components.

18. The structure for radiofrequency applications according to claim 10, further comprising at least one microelectronic device on or in the active layer, wherein the at least one microelectronic device comprises at least one control element and one MEMS switching element comprising an ohmic-contact microswitch or a capacitive microswitch.

19. The structure for radiofrequency applications according to claim 10, further comprising at least one microelectronic device on or in the active layer, wherein the at least one microelectronic device comprises a radiofrequency filter operating by volume or surface sound wave propagation.