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;
- a trapping layer arranged on the supporting substrate;

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 [-20 °C; +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.

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

- an active layer is arranged on the trapping layer;

- the active layer is transferred to the trapping layer by direct bonding;

- the active layer is formed from a semiconducting material;

- the active layer is formed from a piezoelectric material;

- the thickness of the active layer is included between 10 and 50 µm;

- a dielectric layer is arranged between the trapping layer and the active layer;

- the dielectric layer is transferred to the trapping layer by direct bonding;

- the dielectric layer is between 10 nm and 6 µm.

According to other advantageous characteristics according to embodiments of the invention, taken alone or in combination, at least one microelectronic device is present on or in the active layer;

- the microelectronic device is a switching circuit or an antenna adaptation circuit or even a radiofrequency amplification circuit;

- the microelectronic device comprises a plurality of active components and a plurality of passive components;

- the microelectronic device comprises at least one control element and one MEMS switching element consisting of an ohmic-contact microswitch and a capacitive microswitch;

CLAIMS

1. Structure for radiofrequency applications, comprising:

- a semiconducting supporting substrate;

- a trapping layer arranged on the supporting substrate;

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 [-20°C; +120°C].

2. Structure for radiofrequency applications according to claim 1, wherein the trapping layer has a resistivity, at 20°C, of greater than 10 kOhm.cm, preferably greater than 50 kOhm.cm.

3. Structure for radiofrequency applications according to any of the above claims, wherein the 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.

4. Structure for radiofrequency applications according to any of the above claims, wherein the trapping layer comprises microstructures of a size smaller than 20 nm, preferably smaller than 10 nm.

5. Structure for radiofrequency applications according to any of the above claims, wherein the trapping layer comprises a porous or polycrystalline material.

6. Structure for radiofrequency applications according to any of the above claims, wherein the trapping layer comprises polycrystalline silicon including 1 to 20% of carbon.

7. Structure for radiofrequency applications according to any of the above claims, wherein the thickness of the trapping layer is between 10 and 50 µm, preferably between 20 and 30 µm.

8. Structure for radiofrequency applications according to any of the above claims, wherein the supporting substrate comprises at least one of the materials selected from the following group: silicon, silicon germanium and silicon carbide.

9. Structure for radiofrequency applications according to any of the above claims, wherein the resistivity of the supporting substrate is between 10 and 2000 Ohm.cm.

10. Structure for radiofrequency applications according to any of the above claims, wherein an active layer is arranged on the trapping layer.

11. Structure for radiofrequency applications according to claim 10, wherein the active layer is formed from a semiconductor material.

12. Structure for radiofrequency applications according to claim 10, wherein the active layer is formed from a piezoelectric material.

13. Structure for radiofrequency applications according to any of claims 10 to 12, wherein the thickness of the active layer is between 10 and 50 µm.

14. Structure for radiofrequency applications according to claims 10 to 13, wherein a dielectric layer is arranged between the trapping layer and the active layer.

15. Structure for radiofrequency applications according to claim 14, wherein the dielectric layer is between 10 nm and 6 µm.

16. Structure for radiofrequency applications according to any of claims 10 to 15, wherein at least one microelectronic device is present on or in the active layer , wherein the microelectronic device is a switching circuit or an antenna adaptation circuit or a radiofrequency power amplification circuit.

17. Structure for radiofrequency applications according to any of claims 10 to 16, wherein at least one microelectronic device is present on or in the active layer, wherein the microelectronic device comprises a plurality of active components and a plurality of passive components.

18. Structure for radiofrequency applications according to any of claims 10 to 16, wherein at least one microelectronic device is present on or in the active layer, wherein the microelectronic device comprises at least one control element and one MEMS switching element consisting of an ohmic-contact microswitch or of a capacitive microswitch.

19. Structure for radiofrequency applications according to claims 10 to 15, wherein at least one microelectronic device is present on or in the active layer, wherein the microelectronic device is a radiofrequency filter operating by volume or surface sound wave propagation.