SUBJECT MATTER OF THE INVENTION

Embodiments of the present invention aim to overcome all or some of the aforementioned drawbacks. They aim in particular to provide a method for forming a handle substrate presenting high resistivity characteristics and being easy to manufacture.

BRIEF DESCRIPTION OF THE INVENTION

An aspect of the present invention provides a method for forming a high resistivity handle substrate for a composite substrate, the method comprising :
- providing a base substrate made of monocrystalline silicon;
- exposing the base substrate to a carbon single precursor at a pressure below atmospheric pressure to form a polycrystalline silicon carbide layer of at least 10 nm on the surface of the base substrate; and then
- growing a polycrystalline charge trapping layer on the polycrystalline silicon carbide layer.

According to other advantageous and non-limitative features of the invention, taken alone or in any technically achievable combination :

- the base substrate has a resistivity greater than 1000 ohm.cm;

- the base substrate has a resistivity smaller than 1000 ohm.cm;

- the method further comprises forming a silicon intrinsic epitaxial layer directly on the base substrate before exposing the base substrate to the carbon single precursor;

- the charge trapping layer has a thickness greater than 5 or 10 microns;

- the charge trapping layer is made of polycrystalline silicon;

- the carbon single precursor presents a temperature comprised between 700°C and 1200°C;

- the method further comprises exposing the base substrate to a reducing atmosphere at a temperature of at least 900°C to remove a native oxide layer from the base substrate, before exposing the base substrate to the carbon single precursor;

- the polycrystalline silicon carbide layer is stochiometric.

There is also disclosed a high resistivity handle substrate for a composite substrate comprising :

- a base substrate made of monocrystalline silicon;
- a polycrystalline silicon carbide layer presenting a thickness of least 10 nm directly on the surface of the base substrate ;
- a polycrystalline charge trapping layer on the polycrystalline silicon carbide layer.

Optionally, the polycrystalline silicon carbide layer may comprise a concentration of dopant less than 10^14 at/cm^3 and the high resistivity handle substrate may further comprise a silicon intrinsic epitaxial layer in contact with the base substrate and with the polycrystalline silicon carbide layer. The polycrystalline silicon carbide layer is stochiometric.

There is also disclosed a composite substrate comprising a high resistivity handle substrate as previously

CLAIMS

1. A method for forming a high resistivity handle substrate for a composite substrate, the method comprising :
   - providing a base substrate made of monocrystalline silicon;
   - exposing the base substrate to a carbon single precursor at a pressure below atmospheric pressure to form a polycrystalline silicon carbide layer of at least 10 nm on the surface of the base substrate; and then
   - growing a polycrystalline charge trapping layer on the polycrystalline silicon carbide layer.

2. The method of claim 1 wherein the base substrate has a resistivity greater than 1000 ohm.cm.

3. The method of claim 1 wherein the base substrate has a resistivity smaller than 1000 ohm.cm.

4. The method of claim 3 wherein the method further comprises forming a silicon intrinsic epitaxial layer directly on the base substrate before exposing the base substrate to the carbon single precursor.

5. The method of any preceding claims, wherein the charge trapping layer has a thickness greater than 5 or 10 microns.

6. The method of any preceding claims, wherein the charge trapping layer is made of polycrystalline silicon.

7. The method of any preceding claims wherein the carbon single precursor presents a temperature comprised between 700°C and 1200°C.

8. The method of any preceding claims further comprising, exposing the base substrate to a reducing atmosphere at a temperature of at least 900°C to remove a native oxide layer

from the base substrate, before exposing the base substrate to the carbon single precursor.

9. The method of any preceding claims wherein the polycrystalline silicon carbide layer is stochiometric.