SUBJECT MATTER OF THE INVENTION

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

BRIEF DESCRIPTION OF THE INVENTION

~~With a view to achieving this aim, the subject matter~~An aspect of the present invention ~~proposes~~ 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.

~~According to another aspect, the invention also relates to~~ 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.

~~Finally, the invention also relates to~~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 ~~(1)~~ for a composite substrate, the method comprising :
   - providing a base substrate ~~(3)~~ made of monocrystalline silicon;
   - exposing the base substrate ~~(3)~~ to a carbon single precursor at a pressure below atmospheric pressure to form a polycrystalline silicon carbide layer ~~(4)~~ of at least 10 nm on the surface of the base substrate; and then
   - growing a polycrystalline charge trapping layer ~~(2)~~ on the polycrystalline silicon carbide layer.

2. The method of claim 1 wherein the base substrate ~~(3)~~ has a resistivity greater than 1000 ohm.cm.

3. The method of claim 1 wherein the base substrate ~~(3)~~ 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 ~~(3)~~ before exposing the base substrate ~~(3)~~ to the carbon single precursor.

5. The method of any preceding claims, wherein the charge trapping layer ~~(2)~~ has a thickness greater than 5 or 10 microns.

6. The method of any preceding claims, wherein the charge trapping layer ~~(2)~~ 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 ~~(3)~~, before exposing the base substrate ~~(3)~~ to the carbon single precursor.

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