

monocrystalline layer includes carbon and/or nitrogen atoms located at the grain boundaries of the polycrystalline silicon, in a concentration comprised between 2% and 20%, wherein the polycrystalline silicon layer further comprises, on the first portion containing carbon and/or nitrogen atoms, a second portion free from carbon and/or nitrogen atoms in that the concentration in carbon and/or nitrogen in the second portion is less than 0.5%, and wherein the thickness of the first portion of the polycrystalline silicon layer ranges from 10 to 200 nm.

As will be explained in more detail below, the carbon and/or nitrogen atoms are trapped at grain boundaries of the polycrystalline silicon, which slows down the recrystallization kinetics.

This allows reducing the thickness of the polysilicon layer while still avoiding complete recrystallization of said layer at the end of the heat treatment(s).

Such a polysilicon layer with a reduced thickness comprises, at the surface opposite to the monocrystalline substrate, a greater number of grain boundaries and thus traps more efficiently the electrical charges present at said surface than a thicker layer. In addition, a smaller thickness of the polysilicon induces a limited surface roughness and thus minimizes the polishing step and more uniformity grain size across the wafer and wafer-to-wafer.

According to an embodiment, the whole polycrystalline silicon layer contains carbon and/or nitrogen atoms.

In such case, the thickness of the polycrystalline silicon layer ranges from 200 to 1000 nm.

According to another embodiment, the whole thickness of the polycrystalline silicon layer thus preferably ranges from 20 to 500 nm.

According to an embodiment, the monocrystalline substrate comprises at least one of: monocrystalline silicon having an electrical resistivity greater than 500 Ohm.cm, silicon carbide, and/or germanium.

According to an embodiment, the active layer comprises at least one of: a semiconducting material, a dielectric material, a ferroelectric material, and a substructure comprising at least one cavity and at least one suspended element on said cavity.

According to another embodiment, the structure further comprises a dielectric layer on the polycrystalline silicon layer, the active layer being on said dielectric layer.

Another aspect of the invention provides a process for manufacturing a structure for radio frequency applications.

Said process comprises:

- providing a monocrystalline substrate,
- depositing, on said monocrystalline substrate, a polycrystalline silicon layer,
- providing a donor substrate comprising an active layer intended to receive radiofrequency components,

5 - bonding the monocrystalline substrate and the donor substrate such that the polycrystalline silicon layer and the active layer are at the bonding interface,

- transferring the active layer onto the monocrystalline substrate and the polycrystalline silicon layer,

 said process being characterized in that during deposition of at least a first portion of the polycrystalline silicon layer having a thickness that ranges from 10 to 200 nm, and located at the interface with the monocrystalline substrate, carbon and/or nitrogen atoms are deposited in said first portion, in a concentration comprised between 2% and 20%, wherein the polycrystalline silicon layer is deposited by Low-Pressure Chemical Vapor Deposition (LPCVD) in a reactor, a gas containing carbon and/or nitrogen atoms is introduced in the LPCVD reactor to form at least the first portion, and wherein said process further comprises, after the first portion has been deposited, the process comprises stopping the introduction of the gas containing the carbon and/or nitrogen atoms in the LPCVD reactor and further depositing a carbon and/or nitrogen-free second portion of the polycrystalline layer, the concentration in carbon and/or nitrogen in the second portion being less than 0.5%.

 According to an embodiment, said gas is introduced in the LPCVD reactor during the deposition of the whole polycrystalline silicon layer.

 The thickness of the polycrystalline silicon layer thus preferably ranges from 200 to 1000 nm.

25 According to another embodiment, the process further comprises forming a dielectric layer on the polycrystalline silicon layer and/or on the active layer of the donor substrate.

BRIEF DESCRIPTION OF THE DRAWINGS

30 Further features and advantages of the invention will become apparent from the detailed description that follows, based on the appended drawings, wherein:

- FIG. 1 shows a cross sectional view of a known semiconductor on insulator structure comprising a polysilicon layer;

- FIG. 2 shows a cross sectional view of a structure according to an embodiment of the invention;

CLAIMS

1. Structure for radiofrequency applications comprising:
 - a monocrystalline substrate,
 - 5 - a polycrystalline silicon layer directly on the monocrystalline substrate,
 - an active layer on the polycrystalline silicon layer, intended to receive radiofrequency components,

characterized in that at least a first portion of the polycrystalline silicon layer extending from the interface of the polycrystalline silicon layer with the monocrystalline

- 10 layer includes carbon and/or nitrogen atoms located at the grain boundaries of the polycrystalline silicon, in a concentration comprised between 2% and 20%,

wherein the polycrystalline silicon layer further comprises, on the first portion containing carbon and/or nitrogen atoms, a second portion free from carbon and/or nitrogen atoms in that the concentration in carbon and/or nitrogen in the second portion is

- 15 less than 0.5%,

and wherein the thickness of the first portion of the polycrystalline silicon layer ranges from 10 to 200 nm.
2. Structure according to claim 1, wherein the whole polycrystalline silicon layer
- 20 contains carbon and/or nitrogen atoms.
3. Structure according to claim 2, wherein the thickness of the polycrystalline silicon layer ranges from 200 to 1000 nm.
- 25 4. Structure according to claim 1, wherein the thickness of the polycrystalline silicon layer ranges from 20 to 500 nm.
5. Structure according to one of claims 1 to 4, wherein the monocrystalline substrate comprises at least one of: monocrystalline silicon having an electrical resistivity
- 30 greater than 500 Ohm.cm, silicon carbide, and/or germanium.
6. Structure according to one of claims 1 to 5, wherein the active layer comprises at least one of: a semiconducting material, a dielectric material, a ferroelectric material, and a substructure comprising at least one cavity and at least one suspended element on
- 35 said cavity.

7. Structure according to one of claims 1 to 6, wherein said structure further comprises a dielectric layer on the polycrystalline silicon layer, the active layer being on said dielectric layer.

5 8. Process for manufacturing a structure for radiofrequency applications, comprising:

- providing a monocrystalline substrate,
 - depositing, on said monocrystalline substrate, a polycrystalline silicon layer,
 - providing a donor substrate comprising an active layer intended to receive
- 10 radiofrequency components,
- bonding the monocrystalline substrate and the donor substrate such that the polycrystalline silicon layer and the active layer are at the bonding interface,
 - transferring the active layer onto the monocrystalline substrate and the polycrystalline silicon layer,

15 said process being characterized in that during deposition of at least a first portion of the polycrystalline silicon layer having a thickness that ranges from 10 to 200 nm, and located at the interface with the monocrystalline substrate, carbon and/or nitrogen atoms are deposited in said first portion, in a concentration comprised between 2% and 20%,

wherein the polycrystalline silicon layer is deposited by Low-Pressure Chemical Vapor Deposition (LPCVD) in a reactor, a gas containing carbon and/or nitrogen atoms is

20 introduced in the LPCVD reactor to form at least the first portion,

and wherein said process further comprises, after the first portion has been deposited, the process comprises stopping the introduction of the gas containing the carbon and/or nitrogen atoms in the LPCVD reactor and further depositing a carbon

25 and/or nitrogen-free second portion of the polycrystalline layer, the concentration in carbon and/or nitrogen in the second portion being less than 0.5%.

9. Process according to claim 8, wherein said gas is introduced in the LPCVD reactor during the deposition of the whole polycrystalline silicon layer.

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10. Process according to claim 9, wherein the thickness of the polycrystalline silicon layer ranges from 200 to 1000 nm.

11. Process according to one of claims 8 to 10, wherein said process further comprises forming a dielectric layer on the polycrystalline silicon layer and/or on the active layer of the donor substrate.