Claims

1. A process for reducing the boron concentration of a semiconductor layer of a semiconductor-on-insulator substrate, comprising:

- at least one heat treatment cycle, each cycle comprising a thermal oxidation of said semiconductor layer so as to form an oxide layer on the semiconductor layer, wherein, by boron segregation, boron atoms from the semiconductor layer diffuse into the oxide layer so as to create a boron concentration deficit in the semiconductor layer at the interface with the oxide layer, and
- removing the oxide layer,

in which the thermal oxidation comprises a temperature increase under an inert atmosphere above a target thermal oxidation temperature followed by a temperature decrease down to said target thermal oxidation temperature so as to form a temperature gradient in the substrate in order to give rise to a higher rate of formation of the oxide layer at the centre of the semiconductor layer than at the edge.

2. The process according Claim 1, wherein said at least one heat treatment cycle comprises, after the thermal oxidation, annealing under an inert atmosphere for a time suitable for uniformizing the concentration of boron in the semiconductor layer and/or increasing the diffusion of boron atoms towards the sacrificial oxide/semiconductor layer interface.

3. The process according to Claim 2, wherein the annealing is carried out at a temperature of between 800°C and 1200°C.

4. The process according to one of Claims 1 to 3, wherein the thermal oxidation is carried out at a temperature of between 800°C and 1200°C under an oxidizing atmosphere.

5. The process according to one of Claims 1 to 4, wherein the semiconductor layer has a thickness of between 0.01 and 1 µm.

6. The process according to one of Claims 2 to 5, wherein, in each treatment cycle, the thermal oxidation and the annealing are carried out in the same furnace.

7. The process according to any one of Claims 1 to 6, comprising at least a first and a second treatment cycle.

8. The process according to Claim 7, comprising, between the first and second treatment cycles, removal of the oxide layer formed during the first heat treatment cycle.

9. The process according to Claim 7, wherein the second treatment cycle directly follows the first treatment cycle, the oxide layer formed during the first and second treatment cycles being removed after the second treatment.

10. The process according to one of Claims 1 to 9, wherein the semiconductor layer has an initial boron concentration of greater than or equal to 10^{15} at/cm^3.

11. The process according to Claim 10, wherein the semiconductor layer has, after removal of the oxide layer, a final boron content of less than or equal to 5×10^{14} at/cm^3.

12. The process according to one of Claims 1 to 11, wherein the removal of the oxide layer is carried out by selective chemical etching.

13. A process for fabricating a semiconductor-on-insulator substrate, comprising:

- forming a weakened zone by implanting ion species in a donor substrate in order to define a semiconductor layer;
- joining the donor substrate to a carrier substrate via an electrically insulating layer,
- detaching the donor substrate along the weakened zone in order to transfer the semiconductor layer to the carrier substrate, so as to form the semiconductor-on-insulator substrate,
- carrying out the process for reducing the boron concentration of the semiconductor layer according to one of Claims 1 to 12.

14. The process according to Claim 13, comprising, after transferring the semiconductor layer onto the carrier substrate, at least one rapid heat treatment for smoothing the surface of said semiconductor layer, each rapid heat treatment being

performed before the process for reducing the boron concentration of the semiconductor layer is carried out.

15. A process for fabricating a photonic device, comprising the fabrication of a semiconductor-on-insulator substrate according to the process of Claim 13 or Claim 14, and the formation of a passive photonic component in the semiconductor layer having a reduced concentration of boron.