

BRIEF DESCRIPTION OF THE INVENTION

Embodiments of the invention seek to improve the process for fabricating a structure via layer transfer so as to guarantee a regular edge of a transferred layer without any local extension.

5 An aspect of the invention provides a method for determining a suitable implanting energy of at least two atomic species in a donor substrate, to create a weakened zone defining a monocrystalline semiconductor layer to be transferred onto a receiver substrate, comprising the following steps:

- 10 (i) forming a dielectric layer on at least one of the donor substrate and the receiver substrate;
- (ii) co-implanting said species in the donor substrate with a determined energy to form the weakened zone;
- (iii) bonding the donor substrate on the receiver substrate so that said dielectric layer lies at the bonding interface;
- 15 (iv) detaching the donor substrate along the weakened zone to transfer the monocrystalline semiconductor layer and recover the remainder of the donor substrate;
- (v) inspecting the peripheral crown of the remainder of the donor substrate or of the peripheral crown of the receiver substrate on
20 which the monocrystalline semiconductor layer was transferred at step (iv);
- (vi) if said crown exhibits zones transferred onto the receiver substrate, determining the fact that the implanting energy at step (ii) is too high;
- (vii) if said crown does not exhibit zones transferred onto the receiver
25 substrate, determining the fact that the implanting energy at step (ii) is suitable.

Advantageously, step (ii) is implemented on a plurality of donor substrates with different respective implanting energies, and on inspection of the remainder of the donor substrate or of the receiver substrate on which the monocrystalline
30 semiconductor layer has been transferred, a suitable range of implanting energy can be determined for each of said implanting energies.

It is thus possible to determine the maximum implanting energy within said suitable range of implanting energy, and to deduce therefrom the maximum

thickness of the monocrystalline semiconductor layer to be transferred onto the receiver substrate.

Another aspect of the invention provides a process for manufacturing a structure of semiconductor-on-insulator type via transfer of a monocrystalline semiconductor layer from a donor substrate to a receiver substrate, comprising the following steps:

- (a) determining a suitable implanting energy with the above-described method;
- (b) forming a dielectric layer on at least one of the receiver substrate and the donor substrate;
- (c) co-implanting atomic species, such as hydrogen and helium, with the implanting energy determined at step (a), to create a weakened zone in the donor substrate so as to define a monocrystalline semiconductor layer to be transferred;
- (d) molecularly bonding the donor substrate on a receiver substrate, said dielectric layer lying at the bonding interface;
- (e) detaching the donor substrate along the weakened zone to transfer the monocrystalline semiconductor layer onto the receiver substrate.

According to one embodiment of the invention, the suitable implanting energy determined at step (a) corresponds to a thickness of the layer transferred at step (e) that is narrower than the desired thickness for the monocrystalline semiconductor layer of the semiconductor-on-insulator structure, said process further comprising, after step (e), an epitaxy step (f) on the layer transferred onto the receiver substrate until the desired thickness is obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

Other characteristics and advantages of the invention will become further apparent from the following detailed description given with reference to the appended Figures in which:

- Figure 1 is a cross-sectional photo of two bonded wafers showing the edge roll-off of the wafers resulting in the SeOI crown;
- Figure 2 is an overhead photo of the edge of a SeOI wafer having a regular crown;