CLAIMS

1. Method of detaching a layer (12) to be detached from a donor substrate (11), comprising the following steps:

a) Assembling the donor substrate (11) and a porous substrate (13) so that the porous substrate (13) and the layer (12) to be detached include a contact surface (10), the porous substrate (13) including pores and crystallites,

b) Application to the assembly of a treatment (E) of chemical modification of at least the surface of the crystallites included in the porous substrate (13), the chemical modification being adapted to generate a variation of the volume of the crystallites, said volume variation generates deformation in compression or in tension of the porous substrate (13) essentially parallel to the contact surface (10), said deformation in compression or in tension of the porous substrate (13) generates a stress in tension or in compression in the donor substrate (11), said stress in tension or in compression being greater than the mechanical strength of the donor substrate (11) on a fracture plane (14) essentially parallel to the contact surface (10) and delimiting the layer (12) to be detached, said stress leading to the detachment of the layer (12) to be detached from the donor substrate (11) along the fracture plane (14).

2. Detachment method according to Claim 1, in which the treatment (E) is a heat treatment.

3. Detachment method according to Claim 2, in which the heat treatment is a thermal oxidation treatment.

4. Detachment method according to Claim 1, in which the treatment (E) is executed by the action of a chemical solution (15) at a temperature below 100°C.

5. Treatment method according to Claim 4, in which the chemical solution (15) includes hydrofluoric acid and the porous substrate (13)

includes at least one of the materials selected in the following group: silicon, silicon carbide, silicon germanium.

6. Detachment method according to any one of Claims 1 to 5, including a step a') executed before the step a) consisting in deforming the porous substrate (13) in tension or in compression.

7. Detachment method according to Claim 6, in which the step a') includes thermal oxidation.

8. Detachment method according to any one of Claims 1 to 7, in which a dielectric layer (16) is formed on the porous substrate (13) before the step a).

9. Detachment method according to any one of Claims 1 to 8, in which the donor substrate (11) and the porous substrate (13) have the same chemical composition.

10. Detachment method according to any one of Claims 1 to 9, including a step a'') executed before the step a) consisting in weakening the fracture plane (14).

11. Detachment method according to Claim 10, in which the step a'') includes in series:

- implantation of atomic species in the fracture plane (14) of the donor substrate,
- heat treatment at a temperature of the donor substrate (11) below 400°C in a reducing atmosphere.

CLAIMS

1. A method of detaching a layer to be detached from a donor substrate, the method comprising:

assembling the donor substrate and a porous substrate including the layer to be detached such that the porous substrate and the layer to be detached contact one another at an interface, the porous substrate including pores and crystallites; and

after assembling the donor substrate and the porous substrate, applying a treatment to the assembly so as to chemically modify at least some surfaces of the crystallites of the porous substrate, the chemical modification generating a variation of a volume of the crystallites, the volume variation generating deformation in compression or in tension of the porous substrate essentially parallel to the interface, the deformation in compression or in tension of the porous substrate generating a stress in tension or in compression in the donor substrate, the stress in tension or in compression being greater than a mechanical strength of the donor substrate in a fracture plane essentially parallel to the interface and delimiting the layer to be detached, the stress leading to the detachment of the layer to be detached from the donor substrate along the fracture plane.

2. The method of claim 1, wherein the treatment is a heat treatment.

3. The method of claim 2, wherein the heat treatment is a thermal oxidation treatment.

4. The method of claim 3, further comprising deforming the porous substrate in tension or in compression prior to assembling the donor substrate and a porous substrate.

5. The method of claim 3, wherein the donor substrate and the porous substrate have the same chemical composition.

6. The method of claim 1, wherein the treatment is executed by the action of a chemical solution at a temperature below 100ºC.

7. The method of claim 6, wherein the chemical solution includes hydrofluoric acid and the porous substrate includes at least one material selected from the group consisting of silicon, silicon carbide, and silicon germanium.

8. The method of claim 1, further comprising deforming the porous substrate in tension

or in compression prior to assembling the donor substrate and a porous substrate.

9. The method of claim 8, wherein deforming the porous substrate comprises applying a thermal oxidation process to the porous substrate.

10. The method of claim 1, further comprising forming a dielectric layer on the porous substrate prior to assembling the donor substrate and the porous substrate.

11. The method of claim 1, wherein the donor substrate and the porous substrate have the same chemical composition.

12. The method of claim 1, further comprising weakening the fracture plane prior to assembling the donor substrate and the porous substrate.

13. The method of claim 12, wherein weakening the fracture plane comprises:

implanting atomic species into the donor substrate along the fracture plane; and

applying a heat treatment to the donor substrate at a temperature below 400ºC. in a reducing atmosphere.

14. A method for fabricating a structure useful for subsequent manufacture of a micro-electronic device, an optical device, an opto-electronic device, or a photovoltaic device, the method comprising:

bonding a donor substrate to a porous substrate along an interface, the porous substrate including pores and crystallites; and

after bonding a donor substrate to a porous substrate along an interface, chemically modifying at least some of the crystallites so as to cause a volume of the crystallites to change resulting in the generation of compressive or tensile strain in the porous substrate and compressive or tensile stress in the donor substrate, the compressive or tensile stress in the donor substrate causing the donor substrate to fracture along a fracture plane so as to leave a layer of material of the donor substrate on the porous substrate, the layer of material being detached from a remainder of the donor substrate.

15. The method of claim 14, wherein chemically modifying at least some of the crystallites comprises thermally oxidizing at least some of the crystallites.

16. The method of claim 14, wherein chemically modifying at least some of the crystallites comprises exposing the at least some of the crystallites to a chemical solution at a temperature below 100ºC.

17. The method of claim 16, further comprising selecting the chemical solution to include hydrofluoric acid, and selecting the porous substrate to include at least one material selected from the group consisting of silicon, silicon carbide, and silicon germanium.

18. The method of claim 14, further comprising deforming the porous substrate in tension or in compression prior to bonding the donor substrate to the porous substrate such that stress is present within the donor substrate prior to chemically modifying at least some of the crystallites so as to cause a volume of the crystallites to change resulting in the generation of compressive or tensile strain in the porous substrate and compressive or tensile stress in the donor substrate.

19. The method of claim 14, further comprising forming a dielectric layer on the porous substrate prior to bonding the donor substrate to the porous substrate such that the dielectric layer is disposed between the donor substrate and the porous substrate.

20. The method of claim 14, further comprising weakening the fracture plane prior to bonding the donor substrate to the porous substrate, weakening the fracture plane comprising: implanting atomic species into the donor substrate along

the fracture plane; and

applying a heat treatment to the donor substrate at a temperature below 400ºC in a reducing atmosphere.