

CLAIMS

1. Process for producing a stacked structure ~~(100)~~ comprising a receiver substrate ~~(70)~~ and a surface film ~~(60', 60'')~~, the process comprising the following steps:
 - a) providing a carrier substrate ~~(30)~~ and an initial substrate ~~(40)~~, each having a front face ~~(30a, 40a)~~ and a back face ~~(30b, 40b)~~,
 - b) forming a buried weakened plane ~~(32, 42)~~ in the carrier substrate ~~(30)~~ or in the initial substrate ~~(40)~~, by implanting light ions through the front face ~~(30a, 40a)~~ of either of said substrates,
 - c) joining the carrier substrate ~~(30)~~ and the initial substrate ~~(40)~~ via their respective front faces ~~(30a, 40a)~~,
 - d) mechanically and/or chemically thinning the initial substrate ~~(40)~~ via its back face ~~(40b)~~ in order to form a donor substrate ~~(60)~~ comprising a donor layer ~~(45)~~ originating from the initial substrate ~~(40)~~ and arranged on the carrier substrate ~~(30)~~, and the buried weakened plane ~~(32, 42)~~ present in the carrier substrate ~~(30)~~ or in the donor layer ~~(45)~~, the donor substrate ~~(60)~~ having a front face ~~(60a)~~ on the side of the donor layer ~~(45)~~ and a back face ~~(30b)~~ on the side of the carrier substrate ~~(30)~~,
 - e) providing a receiver substrate ~~(70)~~ having a front face ~~(70a)~~ and a back face ~~(70b)~~,
 - f) joining the donor substrate ~~(60)~~ and the receiver substrate ~~(70)~~ via their respective front faces ~~(60a, 70a)~~,
 - g) separating along the buried weakened plane ~~(32, 42)~~, so as to form the stacked structure ~~(100)~~ comprising the receiver substrate ~~(70)~~ and the surface film ~~(60', 60'')~~ including all or part of the donor layer ~~(45)~~.

2. Production process according to the preceding claim, comprising a step, prior to joining step f), of forming at least one functionalized layer ~~(75, 75')~~ on the front face ~~(60a)~~ of the donor substrate ~~(60)~~ and/or on the front face ~~(70a)~~ of the receiver substrate ~~(70)~~, the stacked structure ~~(100)~~ comprising the receiver substrate ~~(70)~~, the surface film ~~(60', 60'')~~ and the functionalized layer ~~(75, 75')~~ inserted between the receiver substrate ~~(70)~~ and the surface film ~~(60', 60'')~~.
3. Production process according to the preceding claim, wherein the functionalized layer ~~(75, 75')~~ comprises a plurality of micro- or nanostructured regions ~~(73')~~ and/or a plurality of cavities ~~(71, 71')~~ and/or a plurality of micro- or nanoelectronic components ~~(72)~~.
4. Production process according to the preceding claim, wherein the components ~~(72)~~ are chosen from among transistors, MEMSs, sensors, resonators, imagers, actuators, radiofrequency filters, diodes and lasers.
5. Production process according to one of the two preceding claims, wherein the cavities ~~(71, 71')~~ have lateral dimensions of between 1 micron and a few hundreds of microns, and a depth of the order of 0.1 micron to a few tens of microns.
6. Production process according to one of the preceding claims, wherein:
 - the buried weakened plane ~~(32)~~ is formed in the carrier substrate ~~(30)~~,
 - and the surface film ~~(60')~~ transferred upon completion of step g) comprises a transferred thin layer ~~(30')~~ originating from the carrier substrate ~~(30)~~.

7. Production process according to the preceding claim, wherein the transferred thin layer ~~(30')~~ is removed by chemical etching.
8. Production process according to one of Claims 1 to 5, wherein:
 - the buried weakened plane ~~(42)~~ is formed in the initial substrate ~~(40)~~,
 - and steps of chemical-mechanical polishing, of chemical etching and/or of cleaning are performed after separating step g) in order to at least partially restore the surface quality of the surface film ~~(60'')~~.
9. Production process according to one of the preceding claims, wherein the surface film ~~(60', 60'')~~ is formed from at least one semiconductor material chosen from among silicon, germanium, silicon carbide, III-V compounds, and/or from at least one insulating material chosen from among sapphire, diamond, and/or from at least one piezoelectric material chosen from among lithium tantalate, lithium niobate.
10. Production process according to one of the preceding claims, wherein the receiver substrate ~~(70)~~ is formed from at least one semiconductor and/or insulating and/or metal, monocrystalline, polycrystalline or amorphous material.
11. Production process according to one of the preceding claims, wherein the receiver substrate ~~(70)~~ has a thickness of between a few tens of microns and 1000 microns.