

precisely localizing the mechanical stress and/or the chemical attack to the weakened interface.

Still other processes, based on separation at an interface by laser (laser lift-off), require the use of a transparent substrate for the functionalized substrate or for the donor substrate, which limits the field of applications.

SUBJECT OF THE INVENTION

The present invention relates to an alternative solution to those of the state of the art, and is targeted at completely or partly overcoming the abovementioned disadvantages. It relates to a process for producing a stacked structure comprising a surface film arranged on a functionalized substrate.

BRIEF DESCRIPTION OF THE INVENTION

An aspect of the invention provides a process for producing a stacked structure comprising a receiver substrate and a surface film, the process comprising:

- a) providing a carrier substrate and an initial substrate, each having a front face and a back face,
- b) forming a buried weakened plane in the carrier substrate by implanting light ions through the front face of the carrier substrate,
- c) joining the carrier substrate and the initial substrate via their respective front faces,
- d) mechanically and/or chemically thinning the initial substrate via its back face in order to form a donor substrate comprising a donor layer originating from the initial substrate and arranged on the carrier substrate, and the buried weakened plane present in the carrier substrate,

the donor substrate having a front face on the side of the donor layer and a back face on the side of the carrier substrate,

e) providing a receiver substrate having a front face and a back face,

f) joining the donor substrate and the receiver substrate via their respective front faces,

g) separating along the buried weakened plane, so as to form the stacked structure comprising the receiver substrate and the surface film including the donor layer and a thin transferred layer that originates from the carrier substrate.

According to advantageous and non-limiting features of the invention, taken alone or in any technically feasible combination:

- the process comprises a step, prior to joining step f), of forming at least one functionalized layer on the front face of the donor substrate and/or on the front face of the receiver substrate, the stacked structure then comprising the receiver substrate, the surface film and the functionalized layer inserted between the receiver substrate and the surface film;
- the functionalized layer comprises a plurality of micro- or nanostructured regions and/or a plurality of cavities and/or a plurality of micro- or nanoelectronic components;
- the components are chosen from among transistors, MEMSs, sensors, resonators, imagers, actuators, radiofrequency filters, diodes and lasers;
- the cavities 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;
- the buried weakened plane is formed in the carrier substrate;

CLAIMS

1. A process for producing a stacked structure comprising a receiver substrate and a surface film, the process comprising:
 - a) providing a carrier substrate and an initial substrate, each having a front face and a back face,
 - b) forming a buried weakened plane in the carrier substrate by implanting light ions through the front face of the carrier substrate,
 - c) joining the carrier substrate and the initial substrate via their respective front faces,
 - d) mechanically and/or chemically thinning the initial substrate via its back face in order to form a donor substrate comprising a donor layer originating from the initial substrate and arranged on the carrier substrate, and the buried weakened plane present in the carrier substrate, the donor substrate having a front face on the side of the donor layer and a back face on the side of the carrier substrate,
 - e) providing a receiver substrate having a front face and a back face,
 - f) joining the donor substrate and the receiver substrate via their respective front faces,
 - g) separating along the buried weakened plane, so as to form the stacked structure comprising the receiver substrate and the surface film including the donor layer and a thin transferred layer that originates from the carrier substrate.
2. The process according to claim 1, further comprising a step, prior to joining step f), of forming at least one functionalized layer on the front face of the donor

substrate and/or on the front face of the receiver substrate, the stacked structure comprising the receiver substrate, the surface film and the functionalized layer inserted between the receiver substrate and the surface film.

3. The process according to claim 2, wherein the functionalized layer comprises a plurality of micro- or nanostructured regions and/or a plurality of cavities and/or a plurality of micro- or nanoelectronic components.
4. The process according to claim 3, wherein the functionalized layer comprises a plurality of micro- or nanoelectronic components, and wherein the components are chosen from among transistors, MEMSs, sensors, resonators, imagers, actuators, radiofrequency filters, diodes and lasers.
5. The process according to claim 3 or 4, wherein the functionalized layer comprises a plurality of cavities, and wherein the cavities 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. The process according to any one of the preceding claims, wherein the transferred thin layer is removed by chemical etching.
7. The process according to one of the preceding claims, wherein the surface film 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.

8. The process according to one of the preceding claims, wherein the receiver substrate is formed from at least one semiconductor and/or insulating and/or metal, monocrystalline, polycrystalline or amorphous material.
9. The process according to one of the preceding claims, wherein the receiver substrate has a thickness of between a few tens of microns and 1000 microns.