CLAIMS

1. A process for transferring a useful layer to a carrier substrate, comprising the following steps:

a) providing a donor substrate including a buried weakened plane, the useful layer being delimited by a front face of the donor substrate and the buried weakened plane;

b) providing a carrier substrate;

c) joining the donor substrate, by the front face, to the carrier substrate along a bonding interface so as to form a bonded structure;

d) annealing the bonded structure in order to increase a level of weakening of the buried weakened plane,

the process being characterized in that:

- a predetermined stress is applied to the buried weakened plane in annealing step d) for a period of time, the predetermined stress being chosen so as to initiate a splitting wave once a given level of weakening has been reached; and
- at the end of the period of time, the given level of weakening having been reached, the predetermined stress causes initiation and self-sustained propagation of the splitting wave along said buried weakened plane, resulting in the useful layer being transferred to the carrier substrate.

2. The process according to the preceding claim, wherein the period of time is between one minute and five hours.

3. The process according to claim 1, wherein the period of time is a fraction of a duration of the anneal between 1% and 100%.

4. The process according to one of the preceding claims, applied to a batch treatment of a plurality of bonded

structures, wherein the predetermined stress is applied to the buried weakened plane of each of the plurality of bonded structures so as to initiate the splitting wave once the given level of weakening has been reached for each bonded structure.

5. The process according to claim 4, wherein the anneal in step d) is performed in a horizontally or vertically configured heat treatment apparatus, suitable for batch-treating the plurality of bonded structures.

6. The process according to one of the preceding claims, wherein the predetermined stress is applied locally to the buried weakened plane of the bonded structure by means of a wedge that is positioned at the bonding interface and exerts a pressing force against chamfered edges of the donor and carrier substrates of said bonded structure so as to generate a tensile strain in the buried weakened plane.

7. The process according to claim 6, wherein the pressing force is between 0.5 N and 50 N.

8. The process according to one of the preceding claims, wherein the given level of weakening is defined by the area occupied by microcavities in the buried weakened plane and is chosen to be between 1% and 90%, preferably between 5% and 40%.

9. The process according to one of the preceding claims, wherein the anneal in step d) reaches a maximum temperature between 300°C and 600°C.

10. The process according to one of the preceding claims, wherein the predetermined stress is applied from the start of the anneal in step d).

11. The process according to one of the preceding claims, wherein the donor substrate and the carrier substrate are made of monocrystalline silicon, and wherein the buried weakened plane is formed by ion implantation of light species into the donor substrate, said light species being chosen from hydrogen and helium, or a combination of hydrogen and helium.