buried oxide layer (and/or a carrier substrate), for accommodating the subjacent cavity.

The publication by Lu Yipeng and David A. Horsley, "Modeling, fabrication, and characterization of piezoelectric micromachined ultrasonic transducer arrays based on cavity SOI wafers." (*Journal of Microelectromechanical Systems* 24.4 (2015) 1142-1149) presents an example of fabrication of a pMUT device from an SOI substrate comprising buried cavities and the advantages that this procures.

Depending on the type of device implemented, the geometry of the cavity (shape, lateral dimensions, depth), of the membrane (thickness) and their planar distribution (inter-cavity distance) will be different. In certain geometry and distribution configurations it may thus turn out to be complex to fabricate substrates comprising a superficial layer placed on a plurality of cavities, and in particular to define a transferring process compatible with the transfer of a superficial layer of small thickness to cavities of large size.

OBJECTIVE OF THE INVENTION

Embodiments of the present invention aim to overcome all or some of the aforementioned drawbacks. They in particular relate to a process for transferring a superficial layer to a substrate comprising a plurality of cavities.

BRIEF DESCRIPTION OF THE INVENTION

An aspect of the invention relates to a process for transferring a superficial layer to a carrier substrate containing cavities, the process comprising:

CLAIMS

1. Process for transferring a superficial layer to a carrier substrate containing cavities, the process comprising:
   - providing a donor substrate,
   - providing the carrier substrate, the latter having a first side and containing cavities, each cavity opening onto said first side and having a bottom and peripheral walls,
   - producing at least one temporary pillar in a least one of the cavities, the pillar having an upper surface that is coplanar with the first side of the carrier substrate,
   - joining the donor substrate and the carrier substrate via the first side of the carrier substrate,
   - thinning the donor substrate, so as to form the superficial layer,
   - removing the at least one temporary pillar.

2. Transferring process according to the preceding claim, wherein:
   - providing the donor substrate comprises implanting light species in said donor substrate, so as to form a buried fragile region that lies between a first portion of the donor substrate, which portion is intended to form the superficial layer, and a second portion of the donor substrate, which portion is intended to form the rest of the donor substrate,
   - thinning the donor substrate comprises separating, via the buried fragile region, the surface layer from the rest of the donor substrate.

3. Transferring process according to the preceding claim, wherein the first portion of the donor substrate has a thickness comprised between 0.2 micron and 2 microns.

4. Transferring process according to Claim 1, wherein the thinning of the donor substrate comprises at least one mechanical grinding operation and/or at least one chemical-mechanical polishing operation and/or at least one chemical etching operation carried out on the back side thereof.

5. Transferring process according to one of the preceding claims, wherein the pillar is separate from the peripheral walls of the cavity.

6. Transferring process according to the preceding claim, wherein the upper surface of the pillar has a circular, square, rectangular or cruciform outline.

7. Transferring process according to one of Claims 1 to 4, wherein the at least one pillar joins at least one peripheral wall of the cavity.

8. Transferring process according to the preceding claim, wherein the upper surface of the at least one pillar forms a grid that joins the peripheral walls of the cavity.

9. Transferring process according to Claim 7, wherein a plurality of pillars form an array of parallel walls that join at their ends the peripheral walls of the cavity.

10. Transferring process according to one of the preceding claims, wherein the joining comprises direct bonding, on the one hand, the donor substrate, and, on the other hand, the first side of the carrier substrate and the upper surface of the at least one pillar.

11. Transferring process according to one of the preceding claims, wherein removing the pillar comprises locally

etching the superficial layer to form a through-aperture in said superficial layer, and chemically etching the pillar via said aperture.

12. Transferring process according to the preceding claim, wherein the aperture is formed plumb with the pillar.

13. Transferring process according to one of the two preceding claims, wherein the aperture has a cross-sectional area smaller than the area of the upper surface of the pillar.

14. Transferring process according to either of Claims 11 and 12, wherein the aperture has a cross-sectional area larger than the area of the upper surface of the pillar.

15. Transferring process according to Claim 11, wherein the aperture is formed in the superficial layer, outside of regions overhanging the at least one cavity.

16. Transferring process according to one of Claims 1 to 10, wherein removing the pillar comprises locally etching a second side of the carrier substrate up to the cavity, in order to form an aperture that communicates with said cavity, and chemically etching the pillar via said aperture.

17. Transferring process according to one of the preceding claims, wherein the pillar comprises at least one material chosen from silicon oxide, silicon nitride, single-crystal silicon, polysilicon, amorphous silicon and porous silicon.

18. Transferring process according to one of the preceding claims, wherein the donor substrate comprises at least one semiconductor or piezoelectric material.