pure, plasma-activated, hydrophilized silicon with roughly 200 - 300 mJ/m^2. The prebonds between the molecule-wetted substrates arise mainly due to the van-der-Waals interactions between the molecules of the different sides of the wafers.

Bonding means for bonding and/or prebonding and/or temporary bonding are intended for bonding as ~~claimed in~~ per embodiments of the invention.

~~This object is achieved with the features of Claims 1 and 12. Advantageous developments of the invention are given in the dependent claims. All combinations of at least two of the features given in the specification, the claims and/or the figures also fall within the framework of the invention. At the given value ranges values which lie within the indicated limits are also to be considered disclosed and claimed in any combination.~~

According to a first aspect, there is provided a device for especially temporary bonding of a first semiconductor substrate with a second semiconductor substrate with the following features: a mounting apparatus for mounting of the first semiconductor substrate on a mounting contour with an active mounting surface of the mounting apparatus with a) an outer ring section for controllable fixing of the first semiconductor substrate and b) an inner ring section which is set back in one at least largely relative to the mounting surface, deformation means for controllable deformation of the first semiconductor substrate, the deformation means being made to act within the outer ring section and bonding means for bonding of the first semiconductor substrate to the second semiconductor substrate by removal of the deformed first semiconductor substrate from the mounting apparatus, wherein the mounting contour in the inner ring section has at least one support surface for supporting the first semiconductor substrate, the support surface being included in the mounting surface, wherein the ring width b_A of the outer ring section is smaller than the ring width b_I of the inner ring section, wherein the ratio of the ring width b_A to b_I is less than 1 to 3.

According to a second aspect, there is provided a method for especially temporary bonding of a first semiconductor substrate to a second semiconductor substrate with the following steps, especially the following sequence: mounting the first semiconductor substrate on a mounting contour with an active mounting surface of the mounting apparatus with a) an outer ring section for controllable fixing of the first semiconductor substrate, b) an inner ring section which is set back in one at least largely relative to the mounting surface, wherein the mounting contour in the inner ring section has at least one support surface for supporting the first semiconductor substrate, the support surface being included in the mounting surface, deforming the first semiconductor substrate within the outer ring section by deformation means for controllable deformation of the first semiconductor substrate bonding the first semiconductor substrate to the second semiconductor substrate by bonding means by removal of the deformed first semiconductor substrate from the mounting apparatus.

According to a third aspect, there is provided a device for especially temporary bonding of a first semiconductor substrate with a second semiconductor substrate with the following features: a mounting apparatus for mounting of the first semiconductor substrate on a mounting contour with an active mounting surface of the mounting apparatus with a) an outer ring section for controllable fixing of the first semiconductor substrate and b) an inner ring section which is set back at least largely relative to the mounting surface, deformation means for controllable deformation and herewith pretensioning of the first semiconductor substrate, wherein the deformation means are designed to act within the outer ring section and bonding means for automatic bonding of the first semiconductor substrate with the second semiconductor substrate due to the pretensioning, wherein the mounting contour in the inner ring section has at least one support surface for supporting the semiconductor semiconductor substrate, the support surface being included in the mounting surface, wherein the ring width b_A of the outer ring section is smaller than the ring width b_I of the inner ring section, wherein the ratio of the ring width b_A to b_I is less than 1 to 3.

~~The~~Embodiments of invention ~~is~~are based on the idea of making contact between the two substrates in a manner as coordinated and at the same time as quasi-independently as possible by at least one of the substrates being exposed to pretensioning which runs radially to the outside, especially concentrically to the middle M of one contact surface of the substrates, before contact-making and then only the beginning of contact-making being influenced, while after contact-making of one section, especially of the middle M of the substrates, the substrate being exposed and bonded in a controlled manner to the opposite substrate automatically based on its pretensioning. The pretensioning is achieved by a deformation of the first substrate by deformation means, the deformation means especially based on their shape acting on the side facing away from the bond side and the deformation being controllable accordingly by using different (especially

CLAIMS

1. A device for especially temporary bonding of a first semiconductor substrate (15) with a second semiconductor substrate (15') with the following features:

- a mounting apparatus for mounting of the first semiconductor substrate (15) on a mounting contour (8, 8', 8", 8"', 8^{IV}) with an active mounting surface (7, 7', 7", 7"', 7^{IV}) of the mounting apparatus with

a) an outer ring section (10) for controllable fixing of the first semiconductor substrate (15) and

b) an inner ring section (11) which is set back in one at least largely relative to the mounting surface (7, 7', 7", 7"', 7^{IV}),

- deformation means for controllable deformation of the first semiconductor substrate (15), the deformation means being made to act within the outer ring section and

- bonding means for bonding of the first semiconductor substrate (15) to the second semiconductor substrate (15') by removal of the deformed first semiconductor substrate (15) from the mounting apparatus, ~~characterized in that~~ wherein the mounting contour (8, 8', 8", 8"', 8^{IV}) in the inner ring section (11) has at least one support surface (12, 12', 12") for supporting the first semiconductor substrate (15), the support surface (12, 12', 12") being included in the mounting surface (7, 7', 7", 7"', 7^{IV}),

wherein the ring width b_A of the outer ring section (10) is smaller than the ring width b_I of the inner ring section (11), wherein the ratio of the ring width b_A to b_I is less than 1 to 3.

2. The device as claimed in Claim 1, wherein the mounting contour (8, 8', 8", 8"', 8^{IV}) and/or the mounting surface (7, 7', 7", 7"', 7^{IV}) and/or the mounting apparatus is/are made rotationally symmetrical, especially concentric to a center Z of the mounting apparatus.

3. The device as claimed in claim 1 or 2, wherein at least one negative pressure channel (3) which interrupts the mounting surface (7, 7', 7", 7"', 7^{IV}) is provided in the outer ring section (10) of the mounting contour (8, 8', 8", 8"', 8^{IV}).

4. The device as claimed in claim 3, wherein the negative pressure channel (3) runs concentrically, especially in the shape of a circular ring, to a center Z of the mounting apparatus, especially around the entire periphery.

~~5. The device as claimed in Claim 3 or 4, wherein the ring width b_A of the outer, especially circular ring-shaped ring section (10) is smaller than the ring width b_I of the inner ring section (11).~~

~~6~~5. The device as claimed in one of the preceding claims, wherein the projection surface of the mounting contour (8, 8', 8", 8"') is at least twice, especially three times, as large as the active mounting surface (7, 7', 7", 7"', 7^{IV}).

~~7~~6. The device as claimed in one of the preceding claims, wherein the support surface (12, 12', 12'') is circular ring shaped, preferably concentrically to the center Z.

~~8~~7. The device as claimed in one of the preceding claims, wherein the deformation means are made to act on the first semiconductor substrate (15) on the side of the mounting surface (7, 7', 7", 7"', 7^{IV}) especially outside, preferably solely outside the mounting surface (7, 7', 7", 7"', 7^{IV}).

~~9~~8. The device as claimed in one of the preceding claims, wherein the deformation means is at least one pressure element (6, 6', 6", 6"') which penetrates the mounting contour (8, 8', 8", 8"', 8^{IV}).

~~10~~9. The device as claimed in one of the preceding claims, wherein the deformation means are made such that the deformation takes place concentrically to the first semiconductor substrate (15).

~~11~~10. The device as claimed in Claim 2, wherein in the inner ring section (11) there are especially individually triggerable fixing elements (16) for fixing of the corresponding fixing sections along the first semiconductor substrate (15).

~~12~~11. A method for especially temporary bonding of a first semiconductor substrate (15) to a second semiconductor substrate (15') with the following steps, especially the following sequence:

- mounting the first semiconductor substrate (15) on a mounting contour (8, 8', 8", 8"', 8^{IV}) with an active mounting surface (7, 7', 7", 7"', 7^{IV}) of the mounting apparatus (1) with

a) an outer ring section (10) for controllable fixing of the first semiconductor substrate (15),

b) an inner ring section (11) which is set back in one at least largely relative to the mounting surface (7, 7', 7", 7"', 7^{IV}), wherein the mounting contour (8, 8', 8", 8"', 8^{IV}) in the inner ring section (11) has at least one support surface (12, 12', 12") for supporting the first semiconductor substrate (15), the support surface (12, 12', 12") being included in the mounting surface (7, 7', 7", 7"', 7^{IV}),

- deforming the first semiconductor substrate (15) within the outer ring section by deformation means for controllable deformation of the first semiconductor substrate (15)

- bonding the first semiconductor substrate (15) to the second semiconductor substrate by bonding means by removal of the deformed first semiconductor substrate (15) from the mounting apparatus.

~~13~~12. The method as claimed in Claim ~~12~~11, wherein bonding takes place essentially concentrically proceeding from the middle M of the contact surface of the first and second semiconductor substrate ~~(15)~~ by deformation of the first semiconductor substrate (15).

~~14~~13. The method as claimed in one of claims ~~12~~11 or ~~13~~12, wherein distortions

and/or strains of the first and/or second semiconductor substrate which have been determined by an upstream measurement method are reduced by action, especially by controlled distortion and/or strain of sections of the first and/or second semiconductor substrate, on the first and/or second semiconductor substrate, especially by means of fixing elements (16) for fixing of corresponding fixing sections.

~~15~~14. A device for especially temporary bonding of a first semiconductor substrate (15) with a second semiconductor substrate (15') with the following features:

- a mounting apparatus for mounting of the first semiconductor substrate (15) on a mounting contour (8, 8', 8", 8"', 8^{IV}) with an active mounting surface (7, 7', 7", 7"', 7^{IV}) of the mounting apparatus with

a) an outer ring section (10) for controllable fixing of the first semiconductor substrate (15) and

b) an inner ring section (11) which is set back at least largely relative to the mounting surface (7, 7', 7", 7"', 7^{IV}),

- deformation means for controllable deformation and herewith pretensioning of the first semiconductor substrate (15), wherein the deformation means are designed to act within the outer ring section and

- bonding means for automatic bonding of the first semiconductor substrate (15) with the second semiconductor substrate (15') due to the pretensioning, ~~characterized in that~~ wherein the mounting contour (8, 8', 8", 8"', 8^{IV}) in the inner ring section (11) has at least one support surface (12, 12', 12") for supporting the semiconductor semiconductor substrate (15), the support surface (12, 12', 12") being included in the mounting surface (7, 7', 7", 7"', 7^{IV}),

wherein the ring width b_A of the outer ring section (10) is smaller than the ring width b_1 of the inner ring section (11), wherein the ratio of the ring width b_A to b_1 is less than 1 to 3.

~~16. A device for especially temporary bonding of a first substrate (15) with a second substrate with the following features:~~

~~a mounting apparatus for mounting of the first substrate (15) on a mounting contour (8, 8', 8", 8"', 8^{IV}) with an active mounting surface (7, 7', 7", 7"', 7^{IV}) of the mounting apparatus with~~

~~a) an outer ring section (10) for controllable fixing of the first substrate (15) and~~

~~b) an inner ring section (11) which is set back in one at least largely relative to the mounting surface (7, 7', 7", 7"', 7^{IV}),~~

~~deformation means for controllable deformation of the first substrate (15), the deformation means being made to act within the outer ring section and~~

~~bonding means for bonding of the first substrate (15) to the second substrate (15') by removal of the deformed first substrate (15) from the mounting apparatus, characterized in that the mounting contour (8, 8', 8", 8"', 8^{IV}) in the inner ring section (11) has at least one support surface (12, 12', 12") for supporting the semiconductor substrate (15), the support surface (12, 12', 12") being included in the mounting surface (7, 7', 7", 7"', 7^{IV})~~

~~wherein the ring width b_A of the outer ring section (10) is smaller than the ring width b_I of the inner ring section (11), wherein the ratio of the ring width b_A to b_I is less than 1 to 3.~~

~~17. A device for especially temporary bonding of a first substrate (15) with a second substrate with the following features:~~

~~a mounting apparatus for mounting of the first substrate (15) on a mounting contour (8, 8', 8", 8"', 8^{IV}) with an active mounting surface (7, 7', 7", 7"', 7^{IV}) of the mounting apparatus with~~

~~a) an outer ring section (10) for controllable fixing of the first substrate (15) and~~

~~b) an inner ring section (11) which is set back at least largely relative to the mounting surface (7, 7', 7", 7"', 7^{IV}),~~

~~deformation means for controllable deformation and herewith pretensioning of the first substrate (15), wherein the deformation means are designed to act within the outer ring section and~~

~~bonding means for automatic bonding of the first substrate (15) with the second substrate (15') due to the pretensioning, characterized in that the mounting contour (8, 8', 8'', 8''', 8^{IV}) in the inner ring section (11) has at least one support surface (12, 12', 12'') for supporting the semiconductor substrate (15), the support surface (12, 12', 12'') being included in the mounting surface (7, 7', 7'', 7''', 7^{IV})~~

~~wherein the ring width b_A of the outer ring section (10) is smaller than the ring width b_I of the inner ring section (11), wherein the ratio of the ring width b_A to b_I is less than 1 to 3.~~