~~Device and Process for Aligning Substrates~~

Claims

1. Device for aligning and bringing a large-area substrate (2, 2') into contact with a carrier substrate (5, 5') for the further processing of the substrate (2, 2') with the following features:

- A substrate holding means (1) for attaching the large-area substrate (2, 2'),
- A carrier substrate holding means (4) for attaching the carrier substrate (5, 5'),
- Detection means (11, 13) for detection, at least in sections, of a peripheral contour (2u) of the large-area substrate (2, 2') attached to the substrate holding means (1) and detection, at least in sections, of a peripheral contour (5u) of the carrier substrate (5, 5') attached to the carrier substrate holding means (4) relative to a contact plane of the large-area substrate (2, 2') with the carrier substrate (5, 5'),
- Aligning means (6, 8) for aligning the large-area substrate (2, 2') relative to the carrier substrate (5, 5'), whereby the aligning means (6, 8) are controlled by controlling means based on the peripheral contours (2u, 5u) detected by the detection means (11, 13), and
- Contacting means (3) for bringing the large-area substrate (2, 2'), aligned relative to the carrier substrate (5, 5'), into contact with the carrier substrate (5, 5').

2. Device according to Claim 1, whereby the detection means (11, 13) relative to the large-area substrate (2, 2') and/or relative to the carrier substrate (5, 5') can be rotated by rotational means (6) and/or can be adjusted relative to the large-area substrate (2, 2') and/or relative to the carrier substrate (5, 5') by an adjustment system (8) in the X- and/or Y-direction parallel to the contact plane.

3. Device according to one of the preceding claims, whereby the detection means (11, 13) are attached to a carrier unit (7) that is designed in particular to be annular in sections and that can be arranged at least in sections on the peripheral side with respect to the large-area substrate (2, 2') and/or the carrier substrate (5, 5').

4. Device according to Claim 3, whereby the carrier unit (7) is attached between the carrier substrate holding means (1) and the substrate holding means (4), in particular with contacting means (3) attached in-between, preferably in the form of a Z-adjustment unit, and/or with a base plate (9) attached in-between.

5. Device according to Claims ~~2~~3 and 4, whereby the adjustment system (8) is attached, in particular directly, between the base plate (9) and the carrier unit (7).

6. Device according to one of the preceding claims, whereby the peripheral contour (2u) of the large-area substrate (2, 2') and the peripheral contour (5u) of the carrier substrate (5, 5') can be detected, in particular simultaneously, with the same, in particular one or more electromagnetically operating, detection means (11, 13), preferably microscopes.

7. Process for aligning and bringing a large-area substrate (2, 2') into contact with a carrier substrate (5, 5') for the further processing of the large-area substrate (2, 2') with the following steps, in particular the following sequence:

- Detection at least in sections of a peripheral contour (2u) of the large-area substrate (2, 2') attached to a substrate holding means (1) and detection at least in sections of a peripheral contour (5u) of the carrier substrate (5, 5') attached to a carrier substrate holding means (4) by vertical scanning detection

means (11, 13) relative to a contact plane of the large-area substrate (2, 2') with the carrier substrate (5, 5'),

- Alignment of the large-area substrate (2, 2') relative to the carrier substrate (5, 5') by alignment means (6, 8), whereby the alignment means (6, 8) are controlled by control means based on the peripheral contours (2u, 5u) detected by the vertical scanning detection means (11, 13), and
- Bringing into contact the large-area substrate (2, 2'), aligned relative to the carrier substrate (5, 5'), with the carrier substrate (5, 5') by contacting means (3).

8. Process according to Claim 7, in which the vertical scanning detection means (11, 13) are rotated for detection of the peripheral contours (2u, 5u) relative to the large-area substrate (2, 2') and/or relative to the carrier substrate (5, 5') by rotational means (6) and/or are adjusted relative to the large-area substrate (2, 2') and/or relative to the carrier substrate (5, 5') by an adjustment system (8) in the X- and/or Y-direction parallel to the contact plane.

9. Process according to Claim 7 or 8, in which the peripheral contour (2u) of the large-area substrate (2, 2') and the peripheral contour (5u) of the carrier substrate (5, 5') are detected, in particular at the same time, with the same, in particular one or more electromagnetically operating, vertical scanning detection means (11, 13), preferably microscopes.

10. Process according to one or more of Claims 7 to 9, in which the detection on uniformly distributed, in particular in each case at least three, positions of the peripheral contours (2u, 5u) is carried out especially sequentially by rotation of the vertical scanning detection means (11, 13) relative to the large-area substrate (2, 2') and/or carrier substrate

(5, 5') and/or arrangement of several detection devices, preferably microscopes, along the peripheral contours (2u, 5u).

11. Process according to one or more of Claims 7 to 10, in which the alignment in an X- and/or Y-direction and/or rotational direction is carried out, whereby the peripheral contours (2u, 5u) are aligned equidistant or concentric with respect to one another, in particular at a gap deviation of less than 50 μm, preferably less than 25 μm, more preferably less than 10 μm, and more preferably less than 5 μm.

12. Process according to one or more of Claims 7 to 11, in which the alignment by the control means is controlled in such a way that the alignment is completed when the value drops below a determinable threshold value for the gap deviations or the sum of in particular quadratic gap deviations, or the sum of in particular quadratic deviations ends at a mean value of the gap deviations.

13. Process according to one or more of Claims 7 to 12, in which the alignment is done continuously until contact is made.

~~14. Use of a large-area substrate (2, 2') with a mean diameter d1 for aligning and bringing into contact a carrier substrate (5, 5') with a mean diameter d2 for the further processing of the large-area substrate (2, 2'), whereby the mean diameter d1 is larger than the mean diameter d2.~~

~~15. Use according to Claim 14, in which the diameter d2 is 500 μm smaller, in particular 400 μm smaller, preferably 300 μm smaller, more preferably 200 μm smaller, and more preferably 100 μm smaller.~~

14. Process for aligning and bringing a large-area substrate (2, 2') having a diameter d1 into contact with a carrier substrate (5, 5') having a diameter d2, the diameter of d1 being larger than the diameter d2, for the further processing of the large-area substrate (2, 2') with the following steps, in particular the following sequence:

- Detection at least in sections of a peripheral contour (2u) of the large-area substrate (2, 2') attached to a substrate holding means (1) and detection at least in sections of a peripheral contour (5u) of the carrier substrate (5, 5') attached to a carrier substrate holding means (4) by detection means (11, 13) relative to a contact plane of the large-area substrate (2, 2') with the carrier substrate (5, 5'),
- Alignment of the large-area substrate (2, 2') relative to the carrier substrate (5, 5') by alignment means (6, 8), whereby the alignment means (6, 8) are controlled by control means based on the peripheral contours (2u, 5u) detected by the detection means (11, 13), and
- Bringing into contact the large-area substrate (2, 2'), aligned relative to the carrier substrate (5, 5'), with the carrier substrate (5, 5') by contacting means (3).