One of the greatest challenges in bonding is in the bonding process itself, i.e. during the bond initiation up to the complete contacting of the contact faces of the substrates. The alignment of the two substrates with respect to one another can still change decisively here compared to the previous alignment. If the two substrate surfaces are first joined together, a separation is theoretically again possible, but is associated with high costs, low throughput and susceptibility to errors.

Embodiments of the present invention provide a device and a method for bonding two substrates, with which the bonding accuracy, in particular at the edge of the substrates, is increased.

According to an aspect of the present invention, there is provided a substrate holder, including a holding surface; and a plurality of fixing elements formed on the holding surface for fixing substrates; wherein the substrate holder is made of silicon carbide or silicon nitride and is used for bonding, and wherein the substrate holder further comprises a curvature changing element configured to apply pressure to the substrate to curve the substrate.

All combinations of at least two features given in the description, in the claims and/or the drawings also fall within the scope of the invention. In stated value ranges, values lying inside the stated limits are also deemed to be disclosed as limiting values and can be claimed in any combination.

The idea underlying the invention is that both substrates are curved before the contacting or bonding and the curvature of at least one of the two substrates is changed by controlling the curvature during the bonding, in particular during the course of a bonding wave, preferably in fusion bonding. The curvature of the other (preferably upper) substrate is preferably also changed in a controlled manner.

The curvature also changes through automatic contacting of the substrates. The automatic contacting takes place in particular through the force of gravity acting on the substrate and/or other forces of attraction

Claims

1. A substrate holder, comprising
   - a holding surface; and
   - a plurality of fixing elements formed on the holding surface for fixing substrates;

   wherein the substrate holder is made of silicon carbide or silicon nitride and is used for bonding, and

   wherein the substrate holder further comprises a curvature changing element configured to apply pressure to the substrate to curve the substrate.

2. The substrate holder according to claim 1, wherein the fixing elements are electrostatic fixing elements.

3. The substrate holder according to claim 1, wherein the fixing elements are provided vacuum holes and are evacuated via lines.

4. The substrate holder according to claim 1, further comprising
   - multiple studs elevated from the holding surface; and
   - spatial regions located between studs and acting as the fixing elements during an evacuation.

5. The substrate holder according to claim 4, wherein each stud has a diameter of less than 5 mm or a height of less than 2 mm.

6. The substrate holder according to claim 4, wherein each stud has a shape selected from pyramid, cylinder, cuboid, cone or spherical shell or has a hemispherical base body.

7. The substrate holder according to claim 4, further comprising lines permitting an evacuation of the spatial regions.

8. The substrate holder according to any one of claims 1 to 7, further comprising at least one sensor located in the holding surface.

9. The substrate holder according to claim 8, wherein the sensor is selected from temperature sensors, pressure sensors, distance sensors or a combination thereof.

10. The substrate holder according to any one of claims 1 to 7, further comprising an edge element surrounding the fixing elements.

11. The substrate holder according to claim 1, wherein the curvature changing element comprises a fluid outlet configured to introduce fluid between the substrate holder and the substrate by which the substrate fixed to the substrate holder can be curved.

12. The substrate holder according to claim 1, wherein the curvature changing element is located in the centre of the substrate holder.

13. The substrate holder according to claim 1, wherein the curvature changing element is a pin which extends through the substrate holder and is configured to be displaceable normal to the substrate holder to curve the substrate fixed to the substrate holder.

14. The substrate holder according to any one of claims 1 to 7, wherein the fixing elements are arranged in at least one concentric zone.

15. The substrate holder according to claim 14, wherein the fixing elements are arranged in four concentric zones.

16. The substrate holder according to any one of claims 1 to 7, wherein the fixing elements arranged along a spiral.

17. The substrate holder according to any one of claims 1 to 7, wherein the fixing elements are are divided into a plurality of zones constituted as hexagons.