

Device and method for bonding substrates

The invention relates to a method for bonding a first substrate with a second substrate and a corresponding device.

Substrates have been joined together by so-called bonding processes for many years in the semiconductor industry. Before the joining, these substrates must be aligned with one another as accurately as possible, wherein divergences in the nanometre range occurring in the meantime play a part. The alignment of the substrates usually takes place by means of alignment marks. Apart from the alignment marks, other, in particular functional elements are also present on the substrates, which also have to be aligned with one another during the bonding process. This alignment accuracy between the individual functional elements is required for the entire substrate surface. Thus, for example, it is not sufficient for the alignment accuracy to be very good in the centre of the substrates, but to diminish towards the edge.

In the prior art, there are a number of methods and systems, with the aid of which an attempt can be made to exert an influence on the bonding process, such as for example publications EP2656378B1 or WO2014191033A1.

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.

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