stress, generally a shift of different component regions of the substrates to one another takes place. In the worst case the two substrates which are to be joined to one another consist of two different materials with different coefficients of thermal expansion. These shifts are the greater, the greater the difference of the coefficients of thermal expansion of the different materials.

Embodiments of this invention disclose a method as efficient as possible for low temperature and/or low pressure bonding of materials.

According to an aspect of the present invention, there is provided a method for bonding of a first ~~at least~~ partially metallic contact surface of a first substrate to a second ~~at least~~ partially metallic contact surface of a second substrate, wherein the contact surfaces are formed as hybrid surfaces, with the following progression: ~~removal of oxides from the contact surfaces,~~ application of a sacrificial layer which is at least ~~predominantly~~partially soluble in the material of at least one of the contact surfaces to at least one of the contact surfaces, wherein the sacrificial layer is applied with a thickness of less than 1000 nm, wherein the sacrificial layer comprises water, wherein the water is applied by a deposition method to at least one of the contact surfaces and/or the water condensates on at least one of the contact surfaces, forming a prebond between the substrates by the water of the sacrificial layer, bonding of the substrates with at least partly a solution of the sacrificial layer in at least one of the contact surfaces~~, wherein the sacrificial layer consists completely of water~~.

All combinations of at least two of the features given in the specification, the claims and/or the figures also fall within the scope of the invention. At the given value ranges, values within the indicated limits will also be considered to be disclosed as boundary values and will be claimed in any combination.

Embodiments of the invention are based on the idea of depositing at least one ultrathin sacrificial layer on at least one of the contact surfaces of the substrates to be bonded, which layer during the bond step as per embodiments of the invention is dissolved in the material surrounding it or is consumed on the interface. Another embodiment of the invention consists in that the bonding of metal surfaces by a prior wetting process with a material, especially at least predominantly a liquid, preferably at least predominantly water, as the sacrificial layer, is used especially for producing a prebond between the substrates. A combination of several sacrificial layers on top of one another is also conceivable, especially preferably the deposition of a solid sacrificial layer and a liquid sacrificial layer which has been deposited thereon. Generally therefore several sacrificial lagers can also be applied on top of one another.

Although the disclosed embodiment of the invention is fundamentally suitable for all classes of materials which meet the necessary prerequisites, mainly metals are suitable as per embodiments of the invention. In the further embodiment, the invention is illustrated by way of example on metal surfaces.

~~Amended~~ Claims

1. A method for bonding of a first ~~at least~~ partially metallic contact surface of a first substrate (1, 1') to a second ~~at least~~ partially metallic contact surface of a second substrate, wherein the contact surfaces are formed as hybrid surfaces, with the following progression:

~~- removal of oxides from the contact surfaces,~~

- application of a sacrificial layer (4) which is at least ~~predominantly~~ partially soluble in the material of at least one of the contact surfaces to at least one of the contact surfaces, wherein the sacrificial layer (4) is applied with a thickness of less than 1000 nm, wherein the sacrificial layer (4) comprises water, wherein the water is applied by a deposition method to at least one of the contact surfaces and/or the water condensates on at least one of the contact surfaces,

- forming a prebond between the substrates (1, 1') by the water of the sacrificial layer (4),

- bonding of the substrates (1, 1') with at least partly a solution of the sacrificial layer (4) in at least one of the contact surfaces~~, wherein the sacrificial layer (4) consists completely of water~~.

2. The method as claimed in Claim 1, in which the sacrificial layer (4) is applied with a thickness of less than ~~1000 nm, preferably less than~~ 100 nm, more preferably less than 10 nm, most preferably less than 1 nm.

3. The method as claimed in one of the preceding claims, in which the ratio of the thickness of the sacrificial layer (4) to the thickness of the substrates (1, 1'), especially of bond regions (3, 3') of the substrates (1, 1'), is less than 1, preferably less than 10^{-2}, preferably less than 10^{-4}, more preferably less than 10^{-6}, still more preferably less than 10^{-8}.

4. The method as claimed in Claim 1, in which at least one of the contact surfaces is formed from several bond regions (3, 3') and bulk material (5) which surrounds the bond regions (3, 3').

5. The method as claimed in Claim 1, in which at least one of the contact surfaces is located in blanket fashion on one bond region (3).