Claims

1. A method for bonding of a first contact surface (3) of a first substrate (1) to a second contact surface (4) of a second substrate (2) with the following steps, especially the following sequence:

- forming at least one reservoir (5, 5') in at least one reservoir formation layer (6, 6') on the first substrate (1) and/or the second substrate (2), the reservoir (5, 5') consisting especially at least largely of an amorphous material, and wherein the forming of the at least one reservoir (5, 5') as reservoir formation layer (6, 6') is made by use of a material selected from the group consisting of a tetraethoxysilane-oxide ~~layer~~ and an amorphous material, especially a silicon oxide produced by thermal oxidation,
- at least partial filling of the reservoir/reservoirs (5, 5') with a first educt or a first group of educts,
- forming or applying a first reaction layer (17) which contains a second educt or a second group of educts to the reservoirs (5, 5'),
- bringing the first contact surface (3) in contact with the second contact surface (4) for formation of a prebond connection,
- forming a permanent bond between the first and second contact surface (3, 4), at least partially strengthened by the reaction of the first educt or the first group with the second educt or the second group.

2. The method as claimed in Claim 1, wherein formation and/or strengthening of the permanent bond takes place by diffusion of the first educt into the first reaction layer (17).

3. The method as claimed in one of the preceding claims, wherein the formation of the permanent bond takes place at a temperature between room temperature and 200°C, especially

during a maximum 12 days, preferably a maximum 1 day, even more preferably a maximum 1 hour, best a maximum 15 minutes.

4. The method as claimed in one of the preceding claims, wherein the irreversible bond has a bond strength of greater than 1.5 J/m^2, especially greater than 2 J/m^2, preferably greater than 2.5 J/m^2.

5. The method as claimed in one of the preceding claims, wherein during the reaction a reaction product (10) with a greater molar volume than the molar volume of the second educt is formed in the first reaction layer (17).

6. The method as claimed in one of the preceding claims, wherein the reservoir formation layer (6, 6') consists essentially completely of an amorphous material, especially a silicon oxide produced by thermal oxidation, and the first reaction layer (17) consists of an oxidizable material, especially predominantly, preferably essentially completely, of Si, Ge, InP, GaP or GaN.

7. The method as claimed in one of the preceding claims, wherein the first substrate (1) has ~~one~~ a second reaction layer (7) and/or the second substrate (2) has ~~one~~ a third reaction layer (7'), at least largely consisting of the second educt or the second group, adjacent to the reservoir formation layers (6, 6').

8. The method as claimed in Claim 8, wherein before the formation of a permanent bond the reservoir formation layer (6, 6') has an average thickness A between 1 angstrom and 10 nm.

9. The method as claimed in one of the preceding claims, wherein the reservoir formation layer (6, 6') and/or the first reaction layer (17) act as growth layer (8).

10. The method as claimed in one of the preceding claims, wherein the reservoir (5, 5') is filled by one or more of the steps cited below:

- exposing the first (3) and/or second contact surface (4) to the atmosphere, especially with a high oxygen and/or water content,
- exposing the first (3) and/or the second contact surface (4) to a fluid consisting especially predominantly, preferably almost completely, of especially deionized H_2O and/or H_2O_2,
- exposing the first (3) and/or second contact surface (4) to N_2 gas and/or O_2 gas and/or Ar gas and/or forming gas, especially consisting of 95% Ar and 5% H_2, especially with an ion energy in the range from 0 to 200 eV.

11. The method as claimed in one of the preceding claims, wherein the average distance (B, B') between the reservoir (5, 5') and the second or the third reaction layer (7, 7') immediately before formation of the permanent bond is between 0.1 nm and 15 nm, especially between 0.5 nm and 5 nm, preferably between 0.5 nm and 3 nm.

12. The method as claimed in one of the preceding claims, wherein the irreversible bond has a bond strength which comprises twice, preferably 4 times, more preferably 10 times, most preferably 25 times the prebond strength.