

Method and Device for Permanent Bonding of Wafers, as well as Cutting Tool

Abstract

This invention pertains to a method for bonding a first bond surface (1o) of a first solid substrate (1) consisting of a first material to a second bond surface (2o) of a second solid substrate (2) consisting of a second material with the following steps, especially in the following sequence:

- working of the first and/or second bond surfaces (1o, 2o) with a cutting tool (5) at a speed v_s that is below a critical speed v_k and at a temperature T_s that exceeds a critical temperature T_k , down to a surface roughness O that is less than $1\text{ }\mu\text{m}$;
- bringing the first solid substrate (1) into contact with the second solid substrate (2) at the bond surfaces (1o, 2o), and
- exposing the solid substrates (1, 2) that are in contact to temperature in order to form a permanent bond that is at least primarily produced by recrystallization at the bond surfaces (1o, 2o) in each case down to a recrystallization depth R that is greater than the surface roughness O of the bond surfaces (1o, 2o) with a bond temperature T_B that exceeds the recrystallization temperature.

This invention furthermore pertains to a corresponding device as well as a cutting tool for working the first and/or the second bond surfaces at a speed v_s that is below a critical speed v_k and at a temperature T_s that exceeds a critical temperature T_k and down to a surface roughness O of less than $1\text{ }\mu\text{m}$.

Figure 2b.