Thermoplastics with a high T_g such as the HD-3007 polyimide suffer from the disadvantage that they are very difficult to clean and that strong solvents a.o. can attack the passivation of the product wafer.

If cross-linked materials are used as a bonding adhesive these are often very difficult to debond, especially if high structures or unfavourable surface materials are present on the product wafer. Here debonding or cleaning is cumbersome and strong chemicals are often required.

One particular disadvantage with known procedures consists in that the adhesive is destroyed as early as during the backside processes due to the temperatures present, as a result of which the wafer detaches itself from its carrier during these processes. This early detachment of the adhesive may lead to the substrate, i.e. the product wafer being destroyed.

Other known methods employ films which are provided with an adhesive layer. This adhesive also loses its adhesive properties when a certain temperature is exceeded. Just as with the above described methods, the connection between carrier substrate and product substrate may come undone as early as when backside processes are carried out, as a result of the high temperatures occurring.

In order to achieve improved debonding a number of layers are often provided between product substrate and carrier substrate. WO2010/121068A2 for example combines an adhesive layer which can be hardened under UV light and a separating layer which can soften under laser light. Irradiation with a laser changes the chemical-physical properties of the separating layer. Debonding of the product substrate and the carrier substrate is effected via the separating layer. Multi-layer systems however are comparatively expensive to manufacture.

Embodiments of the present invention propose a device and a method in order, on the one hand, to achieve maximum bonding power between the substrates at a minimum of cost for all necessary method steps and on the other, to permit non-destructive separation of the thin product substrate from the substrate bond after processing the latter. In addition

the method steps required for this procedure shall be cost-effective and be possible for the most varied kinds of substrates.

The scope of the invention encompasses all combinations of at least two characteristics indicated in the description, the claims and/or the figures. Where value ranges are indicated, all values falling within the said limits shall be deemed disclosed and claimed in any random combination.

According to a first aspect of the present invention, there is provided a method for temporarily bonding a product substrate to the carrier substrate, including the steps of:

a) applying a bonding adhesive to the product substrate and/or the carrier substrate for forming a bonding adhesive layer,

b) connecting the carrier substrate to the product substrate via the bonding adhesive layer,

c) after the step b), hardening merely a partial area of the bonding adhesive layer, wherein a remaining area of the bonding adhesive layer is not hardened or at least not substantially hardened.

According to a second aspect of the present invention, there is provided a device for temporarily bonding a product substrate to the carrier substrate, including:

a) application means for applying a bonding adhesive to the product substrate and/or the carrier substrate for forming a bonding adhesive layer,

b) connecting means for connecting the carrier substrate to the product substrate via the bonding adhesive layer,

c) a hardening device for hardening merely a partial area of the bonding adhesive layer after connecting the carrier substrate to the product substrate, wherein a remaining area of the bonding adhesive layer cannot be hardened or at least not substantially hardened.

The method according to the above aspect of the invention / the device according to the above aspect of the invention in particular has the following advantages:

1. a protective layer exists between product substrate and carrier substrate,

2. hardening of the bonding adhesive layer can be controlled by section,

3. an additional anti-adhesive coating is not required. There is no need for reducing the adhesive power by adding an adhesion-reducing layer. This leads to fewer method steps / the product substrate and/or the carrier substrate do not need to be pre-treated.

The bonding adhesive layer may be an adhesive, e.g. a soluble adhesive, in particular a thermoplastic.

Hardening can be performed by electromagnetic radiation, by heat, by current, by magnetic fields and/or by other methods.

Preferably the bonding adhesive layer is applied full-surface onto the product substrate and/or the carrier substrate. This considerably simplifies the manufacturing process allowing throughput to be increased. In addition the bonding adhesive layer provides a filling layer for protecting the structures and for making it easier to detach the carrier substrate from the product substrate.

Alternatively and preferably the bonding adhesive is applied onto only part of the surface of the product substrate and/or the carrier substrate, in particular in a circular-ring-shaped manner to the outer rim of the