Device and method for separating a temporarily bonded substrate stack

The present invention relates to a method for separating a temporarily bonded substrate stack as well as a corresponding device.

There are countless methods in the prior art for joining substrates to one another. The purpose and aim of the joining is either permanent or temporary substrate stacks. If the substrates are joined temporarily, in particular by means of a bonding layer, they are again separated from one another at another point in the process chain. The separation process is known as debonding. One of the latest and most important methods for separating substrate stacks is laser debonding. In the case of laser debonding, a focused laser beam with high power and defined wavelength scans the substrate stack interface region of two substrates and leads to a separation of the two substrates from one another as a result of the high energy input into the bonding layer.

An evaluation of the debonding process takes place in the prior art after the separation of the substrates from one another, for example by an optical assessment. The surface roughness and the surface quality, for example, are examined.

A problem in the prior art consists in the fact that, as a result of the bombardment with laser beams, destruction of the substrates, in particular of expensive functional components of the substrates, can take place.

Embodiments of the present invention overcome the drawbacks of the prior art and in particular to ensure a separation of the substrate stack in as destruction-free manner as possible, but at the same time in an effective manner.

According to a first aspect of the present invention, there is provided a method for separating a temporarily bonded substrate stack by bombardment of a joining layer of the substrate stack by means of laser beams emitted by a laser, characterised in that laser beams of the laser reflected and/or transmitted at the temporarily bonded substrate stack are detected during the bombardment of the joining layer with the laser beams, wherein monitoring and/or adaptation of parameters of the laser takes place during bombardment of the joining layer.

According to a second aspect of the present invention, there is provided a device for separating a temporarily bonded substrate stack including: means for the bombardment of a joining layer of a substrate stack by means of laser beams emitted by a laser, detection means for detecting laser beams of the laser reflected and/or transmitted at the temporarily bonded substrate stack and/or a reference substrate stack, wherein monitoring and/or adaptation of parameters of the laser can take place during bombardment of the joining layer.

All combinations of at least two features stated in the description, the claims and/or the drawings also fall within the scope of the invention. In the case of the value ranges, values lying within the stated limits are also deemed to be disclosed as limiting values and can be claimed in any combination.