Method and device for the transfer of components

The invention relates to a method for the transfer of electronic components from a sender substrate to a receiver substrate.

The prior art shows the most diverse methods for transferring a product substrate from one carrier substrate to another carrier substrate. Such carrier exchange processes are mentioned in detail for example in publication WO2011120537A1. In recent years, individual functional components are increasingly being stacked above one another or beside one another. It is of crucial importance here that only those components are transferred which have passed a previous electrical test. This thus eliminates the possibility of defective components being transferred.

Embodiments of the present invention provide a method and a device which at least partially eliminate completely eliminate the drawbacks stated in the prior art. Embodiments of the invention provide an improved method and a device for transferring components from a sender substrate to a receiver substrate. Embodiments of the invention provide an improved method and a device for the production of a light-emitting diode, with which the individual components are transferred from a sender substrate to a receiver substrate. Embodiments of the invention provide a method and a device, with which no defective components or only components with specific properties are transferred to the receiver substrate.

According to a first aspect of the present invention, there is provided a method for the transfer of components from a sender substrate to a receiver substrate with at least the following steps: i) provision and/or production of the components on the sender substrate, ii) transfer of the components of the sender substrate to the transfer substrate, iii) transfer of the components from the transfer substrate to the receiver substrate, wherein the components can be transferred selectively by means of bonding means and/or debonding means, wherein individual components or a plurality of components are fixed, locally limited, during the transfer in step ii) and step iii) by the bonding means by laser radiation and released, locally limited, during the transfer in step ii) and step iii) by the debonding means.

According to a second aspect of the present invention, there is provided a device for the transfer of components using the above method, wherein components can be produced and/or provided on a sender substrate, and wherein the components of the sender substrate can be transferred to a transfer substrate, and wherein the components can be transferred from the transfer substrate to the receiver substrate, and wherein the transfer of the components to the transfer substrate and/or the receiver substrate can be carried out selectively by bonding means and/or debonding means.

As disclosed herein, there is provided a light-emitting diode (LED) produced by the above method.

All combinations of at least two features indicated in the description, in the claims and/or the drawings also fall within the scope of the invention. In stated value ranges, values lying inside the stated limits should also be deemed to be disclosed as limiting values and can be claimed in any combination. In the subsequent text, a component is understood to mean an object to be transferred. A component does not necessarily have to have a functionality as such.

C l a i m s

1) A method for the transfer of components (2, 2’, 2”) from a sender substrate (1) to a receiver substrate (8) with at least the following steps:
   i) provision and/or production of the components (2, 2’, 2”) on the sender substrate (1),
   ii) transfer of the components (2, 2’, 2”) of the sender substrate (1) to the transfer substrate (4, 4’),
   iii) transfer of the components (2, 2’, 2”) from the transfer substrate (4, 4’) to the receiver substrate (8),

wherein the components (2, 2’, 2”) can be transferred selectively by means of bonding means (6) and/or debonding means (7),

wherein individual components or a plurality of components are fixed, locally limited, during the transfer in step ii) and step iii) by the bonding means by laser radiation and released, locally limited, during the transfer in step ii) and step iii) by the debonding means.

2. The method according to claim 1, wherein, for a selection, the components (2, 2’, 2”) are tested at least once by an electrical test for functionality.

3. The method according to at least one of the preceding claims, wherein, during the transfer in step ii), the transfer substrate (4, 4’) contacts and/or applies pressure to the components (2, 2’, 2”) provided on the sender substrate (1), so that the components (2, 2’, 2”) are kept in a specific position between the sender substrate (1) and the transfer substrate (4, 4’).

4. The method according to at least one of the preceding claims, wherein, during the transfer in step iii), the components (2, 2’, 2”) arranged on the transfer substrate (4, 4’) contact and/or apply pressure to the receiver substrate (8), so that the components (2, 2’, 2”) are held between the transfer substrate (4, 4’) and the receiver substrate (8).

5. The method according to at least one of the preceding claims, wherein a release layer and/or an adhesion layer is applied respectively on the sender substrate (1) and/or the transfer substrate (4, 4’) and/or the receiver substrate (8) and/or the components (2, 2’, 2”), which layers through the action of the debonding means (7) and/or the bonding means (6), change their adhesive properties with respect to the components (2, 2’, 2”) in an adhesive area (3).

6. The method according to at least one of the preceding claims, wherein the sender substrate (1) and/or the transfer substrate (4, 4') and/or the receiver substrate (8) are designed permeable for the laser radiation.

7. The method according to at least one of the preceding claims, wherein the transfer substrate (4, 4') comprises fixing elements (10), which fix the components (2, 2', 2") during the transfer by surface adhesion.

8. The method according to at least one of the preceding claims, wherein the fixing elements (10) are made of a polymer material and/or are designed similar to a suction cup.

9. The method according to claim 8, wherein the transfer substrate (4, 4') is deformed during the transfer by mechanical and/or pneumatic, means, so that the components (2, 2', 2") are released from the fixing elements (10) and/or fixed by the fixing elements (10) in a manner offset in terms of space and/or time.

10. The method according to at least one of the preceding claims, wherein the transfer substrate (4, 4') is an elastic film.

11. A device for the transfer of components (2, 2', 2") using a method according to at least one of claims 1 to 10, the device comprising a transfer substrate, wherein components (2, 2', 2") can be produced and/or provided on a sender substrate (1), and wherein the components (2, 2', 2") of the sender substrate (1) can be transferred to the transfer substrate (4, 4'), and wherein the components (2, 2', 2") can be transferred from the transfer substrate (4, 4') to the receiver substrate (8), and wherein the transfer of the components (2, 2', 2") to the transfer substrate and/or the receiver substrate can be carried out selectively by bonding means (6) and/or debonding means (7).