

Claims

1. A method of processing a wafer (W), having on one side (1) a device area (2) with a plurality of devices (27), wherein at least one division line (11) is formed on the one side (1) of the wafer (W), and the method comprises:

removing wafer material along the at least one division line (11) from the one side (1) of the wafer (W);

providing a protective film (4);

after removing wafer material along the at least one division line (11), applying the protective film (4), for covering the devices (27) on the wafer (W), to the one side (1) of the wafer (W), so that at least a central area of a front surface (4a) of the protective film (4) is in direct contact with the one side (1) of the wafer (W);

applying a first external stimulus to the protective film (4) during and/or after applying the protective film (4) to the one side (1) of the wafer (W), so that the protective film (4) is attached to the one side (1) of the wafer (W); and

after applying the first external stimulus to the protective film (4), grinding a side (6) of the wafer (W) being opposite to the one side (1) to adjust the wafer thickness, wherein

the wafer material is removed along only a part of the thickness of the wafer (W), and

grinding the side (6) of the wafer (W) being opposite to the one side (1) is performed along a remaining part of the thickness of the wafer (W) in which no wafer material has

been removed, so as to divide the wafer (W) along the at least one division line (11).

2. The method according to claim 1, wherein

the protective film (4) is expandable, and

the method further comprises, after grinding the side (6) of the wafer (W) being opposite to the one side (1), radially expanding the protective film (4) so as to separate the devices (27) from each other.

3. The method according to claim 1, further comprising, after grinding the side (6) of the wafer (W) being opposite to the one side (1):

attaching an adhesive tape (30) to the side (6) of the wafer (W) being opposite to the one side (1), and

radially expanding the adhesive tape (30) so as to separate the devices (27) from each other.

4. The method according to any one of claims 1 to 3, further comprising, after grinding the side (6) of the wafer (W) being opposite to the one side (1), polishing the side (6) of the wafer (W) being opposite to the one side (1).

5. The method according to any one of claims 1 to 4, wherein

the protective film (4) is provided with an adhesive layer (9),

the adhesive layer (9) is provided only in a peripheral area of the front surface (4a) of the protective film (4), the peripheral area surrounding the central area of the front surface (4a) of the protective film (4), and

the protective film (4) is applied to the one side (1) of the wafer (W) so that the adhesive layer (9) comes into contact only with a peripheral portion of the one side (1) of the wafer (W).

6. The method according to any one of claims 1 to 5, wherein a cushioning layer (13) is attached to a back surface (4b) of the protective film (4) opposite to the front surface (4a) of the protective film (4).

7. The method according to claim 6, wherein a base sheet (7) is attached to a back surface of the cushioning layer (13).

8. The method according to claim 7, wherein

a front surface (17) of the base sheet (7) is in contact with the back surface of the cushioning layer (13), and

a back surface (18) of the base sheet (7) opposite to the front surface (17) thereof is substantially parallel to the side (6) of the wafer (W) being opposite to the one side (1).

9. The method according to any one of claims 6 to 8, wherein the cushioning layer (13) is curable by a second external stimulus, such as UV radiation, heat, an electric field and/or a chemical agent.

10. The method according to claim 9, further comprising applying the second external stimulus to the cushioning layer (13) so as to cure the cushioning layer (13), after applying the protective film (4) to the one side (1) of the wafer (W).

11. A method of processing a wafer (W), having on one side (1) a device area (2) with a plurality of devices (27), wherein the method comprises:

providing a protective film (4) having an adhesive layer (9);

applying the protective film (4), for covering the devices (27) on the wafer (W), to the one side (1) of the wafer (W), so that a central area of a front surface (4a) of the protective film (4) is in direct contact with the one side (1) of the wafer (W);

applying an external stimulus to the protective film (4) during and/or after applying the protective film (4) to the one side (1) of the wafer (W), so that the protective film (4) is attached to the one side (1) of the wafer (W); and

processing the side (6) of the wafer (W) being opposite to the one side (1), wherein

the adhesive layer (9) is provided only in a peripheral area of the front surface (4a) of the protective film (4), the peripheral area surrounding the central area of the front surface (4a) of the protective film (4),

the protective film (4) is applied to the one side (1) of the wafer (W) so that the adhesive layer (9) comes into contact only with a peripheral portion of the one side (1) of the wafer (W), and

an attachment force between the central area of the front surface (4a) of the protective film (4) and the one side (1) of the wafer (W) is generated through the application of the external stimulus.

12. The method according to claim 11, wherein processing the side (6) of the wafer (W) being opposite to the one side (1) comprises grinding the side (6) of the wafer (W) being opposite to the one side (1) to adjust the wafer thickness.

13. The method according to any one of the preceding claims, wherein applying the external stimulus to the protective film

(4) comprises heating the protective film (4) and/or cooling the protective film (4) and/or applying a vacuum to the protective film (4) and/or irradiating the protective film (4) with light.

14. The method according to any one of the preceding claims, wherein the protective film (4) is made of a polymer, in particular, a polyolefin.