[0010] In accordance with the Detailed Description, a method for chip-to-wafer integration is provided. The method includes the steps of: placing at least one chip on a wafer to form an integrated product; forming a film on the integrated product, such that the film over the integrated product is substantially fluid-tight; exerting a predetermined positive pressure on the film during permanent bonding of the at least one chip to the wafer; and removing the film from the integrated product after permanent bonding of the at least one chip to the wafer.

[0011] In accordance with a further embodiment, an apparatus for chip-to-wafer integration is provided. The apparatus includes a coating module, a bonding module and a cleaning module. The coating module forms a film on an integrated product, wherein the integrated product being formed by placing at least one chip to a wafer such that the integrated product is substantially fluid-tight. The bonding module exerts pressure on the film during permanent bonding of the at least one chip to the wafer. And the cleaning module removes the film from the integrated product.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

[0013] Figure 1 shows a diagram illustrating a cross-sectional view of a chip-on-wafer when a top stage is pressed on the chips according to a first prior art.

[0014] Figure 2 shows a diagram illustrating a cross-sectional view of a chip-on-wafer when a top stage is pressed on the chips according to a second prior art.

[0015] Figure 3 shows a flow chart illustrating a method for chip-to-wafer integration according to an example embodiment.

[0016] Figure 4A shows a diagram illustrating a cross-sectional view of the at least one chip and wafer obtained from step 304 of Figure 3 in accordance with the embodiment.

CLAIMS

1. A method for chip-to-wafer integration, the method comprising the steps of:

placing at least one chip on a wafer to form an integrated product;

forming a film on the integrated product, such that the film over the integrated product is substantially fluid-tight;

exerting a predetermined positive pressure on the film during permanent bonding of the at least one chip to the wafer; and

removing the film from the integrated product after permanent bonding of the at least one chip to the wafer.

2. The method as claimed in claim 1, further comprising the step of:

regulating a temperature of the integrated product during permanent bonding of the at least one chip to the wafer.

3. The method as claimed in claim 1, wherein placing the at least one chip to the wafer comprises the steps of:

aligning the at least one chip to the wafer; and

temporarily bonding the at least one chip to the wafer to form the integrated product.

4. The method as claimed in claim 1, wherein forming the film on the integrated product comprises:

spray-coating the film on the integrated product in a vacuum chamber; and

curing the film on the integrated product in the vacuum chamber.

5. The method as claimed in claim 1, wherein forming the film on the integrated product comprises the steps of:

spray-coating the film on the integrated product;

curing the film; and

removing trapped gas between the cured film and the integrated product.

6. The method as claimed in claim 1, wherein forming the film on the integrated product comprises the steps of:

depositing the film on the integrated product;

curing the film; and

removing trapped gas between the cured film and the integrated product.

7. The method as claimed in claim 1, wherein exerting pressure on the film comprises increasing gas pressure on the film to a predetermined positive pressure.

8. The method as claimed in claim 1, wherein removing the film from the integrated product comprises the steps of:

placing the integrated product with the film thereon in a spinning member; and

adding chemical solvent onto the film.

9. The method as claimed in claim 2, wherein regulating the temperature of the integrated product comprises increasing gas temperature around the integrated product to a bonding temperature.

10. The method as claimed in claim 5, wherein the curing step comprises curing the film at a temperature of 50°C or less.

11. The method as claimed in claim 10, wherein the curing step comprises curing the film without heating it.

12. The method as claimed in claim 6, wherein the curing step comprises curing the film at a temperature of 50°C or less.

13. The method as claimed in claim 10, wherein the curing step comprises curing the film without heating it.

14. The method as claimed in claim 5, wherein the spray-coating step comprises spray-coating the film on the integrated product to a thickness of between ten microns and two millimeters.

15. The method as claimed in claim 14, wherein the spray-coating step comprises spray-coating the film on the integrated product to a thickness of between ten microns and one millimeter.

16. The method as claimed in claim 6, wherein the deposition step comprises depositing the film on the integrated product to a thickness of between ten microns and two millimeters.

17. The method as claimed in claim 16, wherein the deposition step comprises depositing the film on the integrated product to a thickness of between ten microns and one millimeter.

18. The method as claimed in claim 1, wherein the step of forming the film comprises forming the film on the integrated product from a material which is not porous after curing and which has a working temperature after curing greater than 200°C, such that the film over the integrated product is substantially fluid-tight.