

CLAIMS

1. A method for dicing a wafer comprising:

providing a wafer having first and second major surfaces, wherein the wafer is prepared with a plurality of dies on main device regions and are spaced apart from each other by dicing channels on the first major surface of the wafer, wherein the wafer is processed to include a passivation layer formed over the main device regions on the active surface of the wafer and does not extend over the dicing channels;

providing a film over first or second major surface of the wafer, wherein the film covers at least areas corresponding to the main device regions; and

using the film as an etch mask, plasma etching the wafer through exposed semiconductor material of the wafer to form gaps to separate the plurality of dies on the wafer into a plurality of individual dies.

2. The method of claim 1 wherein the first major surface of the wafer is an active surface where integrated circuits are defined and the second major surface of the wafer is a passive surface.

3. The method of claim 2 comprising providing a support platform and attaching the active surface of the wafer to the support platform.

4. The method of claim 3 wherein the wafer comprises one or more monitoring patterns formed in the dicing channels of the wafer and the one or more monitoring patterns contact the support platform when the active surface of the wafer is attached to the support platform.

5. The method of claim 4 comprising removing the individual dies from the support platform, wherein the monitoring patterns remain on surface of the support platform after the individual dies are removed.
6. The method of claim 2 wherein providing the film comprises providing a die attach film over the passive surface of the wafer.
7. The method of claim 6 wherein providing the film further comprises processing the die attach film by selectively removing portions of the die attach film disposed over areas corresponding to the dicing channels/streets on the active surface of the wafer, wherein the processed die attach film serves as the etch mask and the plasma etching process removes the exposed semiconductor material of the wafer through the passive surface of the wafer.
8. The method of claim 1 wherein providing the film comprises providing a backside protective layer over the passive surface of the wafer.
9. The method of claim 8 wherein providing the film further comprises processing the backside protective layer by selectively removing portions of the backside protective layer disposed over areas corresponding to the dicing channels/streets on the active surface of the wafer, wherein the processed backside protective layer serves as the etch mask and the plasma etching process removes the exposed semiconductor material of the wafer through the passive surface of the wafer.
10. The method of claim 1 wherein the wafer comprises one or more monitoring patterns formed in the dicing channels of the wafer.

11. The method of claim 10 wherein the passivation layer covers the main device regions without covering the one or more monitoring patterns formed in the dicing channels of the wafer.
12. The method of claim 11 wherein providing the film comprises providing a backside protective layer over the second major surface of the wafer.
13. The method of claim 12 wherein providing the film further comprises processing the backside protective layer by selectively removing portions of the backside protective layer disposed over areas corresponding to the dicing channels/streets on the first major surface of the wafer, wherein the processed backside protective layer serves as the etch mask and the plasma etching process removes the exposed semiconductor material of the wafer through the second major surface of the wafer.
14. The method of claim 12 comprising removing the individual dies using a die pick up process, wherein the passivation layer of each die is severed and separated from each other when the dies are removed by the die pick up process.
15. The method of claim 12 comprising performing a non-etching process through the gaps formed during the plasma etching process to sever and separate the passivation layer of each die from each other.
16. The method of claim 15 wherein performing the non-etching process comprises applying a jet of air blow or laser beam through the gaps.

17. A method for dicing a wafer comprising:

providing a wafer having first and second major surfaces, wherein the wafer is prepared with a plurality of dies on main device regions and are spaced apart from each other by dicing channels on the first major surface of the wafer, wherein the first major surface of the wafer is an active surface where integrated circuits are defined and the second major surface of the wafer is a passive surface, and the wafer is processed to include a passivation layer formed over at least the main device regions on the active surface of the wafer and does not extend over the dicing channels;

providing a support platform and attaching the active surface of the wafer to the support platform;

providing a film over first or second major surface of the wafer, wherein the film covers at least areas corresponding to the main device regions; and

using the film as an etch mask, plasma etching the wafer through exposed semiconductor material of the wafer to form gaps to separate the plurality of dies on the wafer into a plurality of individual dies.

18. A method for dicing a wafer comprising:

providing a wafer having first and second major surfaces, wherein the wafer is prepared with a plurality of dies on main device regions and are spaced apart from each other by dicing channels on the first major surface of the wafer, wherein the first major surface of the wafer is an active surface where integrated circuits are defined and the second major surface of the wafer is a passive surface;

providing a passivation layer over the active surface of the wafer, wherein the passivation layer is formed over main device regions on the active surface of the wafer;

forming a plurality of die contacts on die contact pads exposed by openings in the passivation layer;

providing a support platform and attaching the passive surface of the wafer to be in direct contact with the support platform while the active surface of the wafer having the plurality of die contacts is away from the support platform;

processing the passivation layer by performing a non-etching process to remove portions of the passivation layer over the dicing channels to form gaps in the passivation layer; and

plasma etching the wafer through exposed active surface of the wafer having the plurality of die contacts to form gaps to separate the plurality of dies on the wafer into a plurality of individual dies, wherein plasma etching the wafer is performed after processing the passivation layer.

19. The method of claim 18 wherein the processed passivation layer serves as an etch mask for the plasma etching process, and the plasma etching process selectively removes silicon material of the wafer through the exposed active surface to form the gaps separating the plurality of dies.

20. The method of claim 18 wherein the passivation layer, which is formed over the main device regions of the wafer, does not extend over the dicing channels of the wafer.