

CLAIMS

1. A manufacturing method for a support piece used in manufacturing of a semiconductor device having a dolmen structure, the semiconductor device comprising: a substrate; a first chip disposed on the substrate; a plurality of support pieces disposed around the first chip on the substrate; and a second chip disposed to be supported by the plurality of support pieces and to cover the first chip, the method comprising processes of:

(A) preparing a laminate film comprising a base material film, an adhesive layer and a support piece formation film in order; and

(B) forming the support pieces on a surface of the adhesive layer by singulating the support piece formation film,

wherein the support piece formation film is a resin film comprising a thermosetting resin layer, ~~or a film comprising a layer in which at least a part of a thermosetting resin layer is cured,~~ and

wherein the process (B) comprises, ~~in order:~~

~~a process of~~ forming a partial cut in the support piece formation film that extends partway in a thickness direction of the support piece formation film, so as to partially cut into the thermosetting resin layer; and

~~a process of~~ singulating the support piece formation film in a cooled state by imparting an expansion to the laminate film that stretches the base material film and the adhesive layer, wherein the support piece formation film is caused to split from the partial cut in the thickness direction in response to a stretching of the adhesive layer.

2. A manufacturing method for a support piece used in manufacturing of a semiconductor device having a dolmen structure, the semiconductor device comprising: a substrate; a first chip disposed on the substrate; a plurality of support pieces disposed around the first chip

on the substrate; and a second chip disposed to be supported by the plurality of support pieces and to cover the first chip, the method comprising processes of:

(A) preparing a laminate film comprising a base material film, an adhesive layer, and a support piece formation film in order; and

(B) forming the support pieces on a surface of the adhesive layer by singulating the support piece formation film,

wherein the support piece formation film is a multi-layer film, ~~the multi-layer film~~ comprising a thermosetting resin layer and a ~~resin~~-high-rigidity layer having a rigidity ~~higher~~-greater than a rigidity of the thermosetting resin layer, ~~or comprising a thermosetting resin layer and~~
wherein the high-rigidity layer is a resin layer or a metal layer ~~having a rigidity higher than a rigidity of the thermosetting resin layer,~~

wherein, in the laminate film, the thermosetting resin layer is positioned between the ~~resin~~-high-rigidity layer and the adhesive layer, ~~or between the metal layer and the adhesive layer,~~ and

wherein the process (B) comprises, ~~in order:~~

~~a process of cutting the resin layer or the metal layer of~~ forming a partial cut in the support piece formation film ~~to form a cut in that extends through the high-rigidity layer and partially into~~ the thermosetting resin layer ~~partway~~ in a thickness direction of the support piece formation film; and

~~a process of~~ singulating the support piece formation film in a cooled state by imparting an expansion to the laminate film that stretches the base material film and the adhesive layer, wherein the support piece formation film is caused to split from the partial cut in the thickness direction in response to a stretching of the adhesive layer.

3. The manufacturing method for a support piece according to claim 2, wherein the resin layer is a polyimide layer.

4. The manufacturing method for a support piece according to

claim 2, wherein the metal layer is a copper layer or an aluminum layer.

5. The manufacturing method for a support piece according to any one of claims 1 to 4,

wherein the base material film has thermal contractility,

wherein the adhesive layer comprises a circumferential edge region that is not covered by the support piece formation film, ~~and~~

wherein in the process (B), the support piece formation film is singulated in a state in which a dicing ring ~~is pasted to~~ contacts the circumferential edge region to surround the support piece formation film, and

wherein the method further comprises a process of heating an inside region of the dicing ring of the base material film to contract the base material film of the inside region, after the process (B).

6. The manufacturing method for a support piece according to any one of claims 1 to 5,

wherein the adhesive layer is an ultraviolet-curable adhesive layer, and

wherein the method further comprises a process of irradiating the adhesive layer with an ultraviolet ray, after the process (B).

7. A semiconductor device manufacturing method ~~for a semiconductor device having a dolmen structure, the semiconductor device comprising: a substrate; a first chip disposed on the substrate; a plurality of support pieces disposed around the first chip on the substrate; and a second chip disposed to be supported by the plurality of support pieces and to cover~~

~~the first chip~~, the method comprising processes of:

forming the support pieces on ~~a~~the surface of the adhesive layer, by the manufacturing method according to any one of claims 1 to 6;

(C) picking up ~~a~~the support ~~piece~~pieces from the adhesive layer;

(D) disposing ~~a~~the first chip on a substrate;

(E) disposing the ~~plurality of~~ support pieces around the first chip or around a region in which the first chip is to be disposed on the substrate;

(F) preparing an adhesive piece-attached chip comprising ~~a~~the second chip and a bonding adhesive piece provided on one surface of the second chip; and

(G) constructing ~~a~~the dolmen structure of the semiconductor device by disposing the adhesive piece-attached chip on surfaces of the ~~plurality of~~ support pieces.

8. A laminate film comprising, in order:

a base material film;

an adhesive layer; and

a support piece formation film that is a resin film comprising at least a thermosetting resin layer ~~or a layer in which at least a part of a thermosetting resin layer is cured~~,

wherein the support piece formation film has a first surface and a second surface opposite to the first surface to face the adhesive layer,

wherein the support piece formation film has a partial cut extending in the support piece formation film that extends partway in a thickness direction, ~~in a surface on a side opposite to a surface facing the adhesive layer~~ from the first surface, the partial cut extending partially into the thermosetting resin layer, and

wherein the base material and the adhesive layer are set to stretch in response to an expanding force, to cause the support piece formation film to split along the partial cut in a cooled state of the laminate film.

9. A laminate film comprising, in order:
a base material film;

an adhesive layer; and

a support piece formation film comprising a thermosetting resin layer and a ~~resin-~~high-rigidity layer having a rigidity ~~higher-~~greater than a rigidity of the thermosetting resin layer, ~~or comprising a thermosetting resin layer and a metal layer having a rigidity higher than a rigidity of the thermosetting resin layer,~~

wherein the thermosetting resin layer is positioned between the ~~resin-~~high-rigidity layer and the adhesive layer, ~~or the thermosetting resin layer is positioned between the metal layer and the adhesive layer, and~~

wherein the support piece formation film has a first surface and a second surface opposite to the first surface to face the adhesive layer,

wherein the support piece formation film has a partial cut ~~cutting the resin layer or the metal layer and~~ extending through the high-rigidity layer and partially in the thermosetting resin layer ~~partway~~ in a thickness direction from the first surface, ~~in a surface on a side opposite to a surface facing the adhesive layer and~~

wherein the base material and the adhesive layer are set to stretch in response to an expanding force, to cause the support piece formation film to split along the partial cut in a cooled state of the laminate film.

10. The manufacturing method according to claim 1, wherein the support piece formation film is a single-layer film constituted of the thermosetting resin layer.

11. The manufacturing method according to claim 1, wherein the support piece formation film is constituted of resin layers including the thermosetting resin layer, and wherein at least a part of the thermosetting resin layer is cured.

12. The manufacturing method according to claim 1, wherein the laminate film includes a central region in which the adhesive layer is layered between the base material film and the support piece formation film, and

a circumferential edge region surrounding the central region, in which the adhesive layer is not covered by the support piece formation film, and wherein the expansion is imparted via a dicing ring that contacts the adhesive layer along the circumferential edge region, and via a tension ring that is located inside the dicing ring to contact the base material film along the circumferential edge region.

13. The manufacturing method according to claim 2, wherein the high-rigidity layer is interposed between a first thermosetting resin layer and a second first thermosetting resin layer of the support piece formation film, wherein the thermosetting resin layer that is positioned between the high-rigidity layer and the adhesive layer is the second thermosetting resin layer, and wherein the partial cut is formed to cut through the first thermosetting resin layer in addition to the high-rigidity layer.

14. The manufacturing method according to claim 2, wherein the laminate film includes a central region in which the adhesive layer is layered between the base material film and the support piece formation film, and a circumferential edge region surrounding the central region, in which the adhesive layer is not covered by the support piece formation film, and wherein the expansion is imparted via a dicing ring that contacts the adhesive layer along the circumferential edge region, and via a tension ring that is located inside the dicing ring to contact the base material film along the circumferential edge region.

15. The manufacturing method according to claim 1, wherein a depth of the partial cut in the thermosetting resin layer corresponds to 25 to 50% of a total thickness of the support piece formation film.

16. The laminate film according to claim 8, wherein the support piece formation film is a single-layer film constituted of the thermosetting resin layer.

17. The laminate film according to claim 8,
wherein the support piece formation film is constituted of resin layers including the thermosetting resin layer, and
wherein at least a part of the thermosetting resin layer is cured.

18. The laminate film according to claim 8, wherein a depth of the partial cut in the thermosetting resin layer corresponds to 25 to 50% of a total thickness of the support piece formation film.

19. The laminate film according to claim 9,
wherein the high-rigidity layer is interposed between a first thermosetting resin layer and a second first thermosetting resin layer of the support piece formation film,
wherein the thermosetting resin layer that is positioned between the high-rigidity layer and the adhesive layer is the second thermosetting resin layer, and
wherein the partial cut is formed to cut through the first thermosetting resin layer in addition to the high-rigidity layer.

20. The laminate film according to claim 9, wherein a depth of the partial cut in the thermosetting resin layer corresponds to 25 to 50% of a total thickness of the thermosetting resin layer.