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, and

wherein the process (B) comprises:

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

singulating the support piece formation film by cool expansion in a temperature condition of -15 to 0°C by imparting a tensile force to the base material film by thrusting up an inside region of the base material film in a dicing ring DR with a ring R.

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, comprising a thermosetting resin layer and a high-rigidity layer having a rigidity greater than a rigidity of the thermosetting resin layer,

wherein the high-rigidity layer is a resin layer or a metal layer,

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

wherein the process (B) comprises:

forming a partial cut in the support piece formation film that extends through the high-rigidity layer and partially into the thermosetting resin layer in a thickness direction of the support piece formation film; and

singulating the support piece formation film by cool expansion in a temperature condition of -15 to 0°C by imparting a tensile force to the base material film by thrusting up an inside region of the base material film in a dicing ring DR with a ring R.

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,

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

wherein the method further comprises a process of heating the inside region of the base material film in the dicing ring DR 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, the method comprising processes of:

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

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

(D) disposing the first chip on a substrate;

(E) disposing the 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 the second chip and a bonding adhesive piece provided on one surface of the second chip; and

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

8. The manufacturing method according to claim 1, wherein the support

piece formation film is a single-layer film constituted of the thermosetting resin layer.

9. 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.

10. 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 cool expansion is imparted via the dicing ring DR that is pasted to the adhesive layer along the circumferential edge region, and via the ring R.

11. 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.

12. 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 cool expansion is imparted via the dicing ring DR that is pasted to the adhesive layer along the circumferential edge region, and via the ring R.

13. 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.

14. 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,

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 in a thickness direction from the first surface, the partial cut extending partially into the thermosetting resin layer, and

wherein the support piece formation film is singulated by cool expansion in a temperature condition of -15 to 0°C by a tensile form imparted to the base material by a thrusting up of an inside region of the base material film in a dicing ring DR with a ring R.

15. The laminate film according to claim 14, wherein the support piece formation film is a single-layer film constituted of the thermosetting resin layer.

16. The laminate film according to claim 14,
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.

17. The laminate film according to claim 14, 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.

18. 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 high-rigidity layer having a rigidity greater than a rigidity of the thermosetting resin layer, wherein the high-rigidity layer is a resin layer or a metal layer,

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

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 through the high-rigidity layer and partially in the thermosetting resin layer in a thickness direction from the first surface, and

wherein the support piece formation film is singulated by cool expansion in a temperature condition of -15 to 0°C by a tensile form imparted to the base material by a thrusting up of an inside region of the base material film in a dicing ring DR with a ring R.

19. The laminate film according to claim 18,
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 18, 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.