

CLAIMS

1. A 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:

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

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

(C) picking up a said support piece 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 dolmen structure by disposing the adhesive piece-attached chip on surfaces of the plurality of support pieces,

wherein the support piece formation film is ~~one of a film comprising a thermosetting resin layer; a film comprising a layer in which at least a part of a thermosetting resin layer is cured; a multi-layer film comprising a thermosetting resin layer and a resin layer having a~~

~~rigidity higher than a rigidity of the thermosetting resin layer; and a multi-layer film comprising a thermosetting resin layer and a metal layer having a rigidity higher than a rigidity of the thermosetting resin layer~~a single-layer film comprising solely a thermosetting resin composition;

wherein the support piece comprises solely a thermosetting resin composition; and

wherein the support piece and a cured product thereof directly contacts the substrate.

2. The manufacturing method for a semiconductor device according to claim 1,

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 between the process (B) and the process (C).

3. The manufacturing method for a semiconductor device according to claim 1 or 2, further comprising a process of heating the support piece formation film or the support piece before the process (G).

4. 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,

wherein a support piece comprises a cured product [solely](#) of a

thermosetting resin composition; the support piece ~~comprises a layer comprising a cured product of a thermosetting resin composition and a resin layer; or the support piece comprises a layer comprising a cured product of a thermosetting resin composition and a metal layer~~ and the cured product thereof directly contacting the substrate,

wherein the semiconductor device further comprises a bonding adhesive piece provided to cover at least a region of the second chip facing the first chip,

wherein the first chip is apart from the bonding adhesive piece, and wherein the bonding adhesive piece continuously extends to a circumferential edge of the second chip from the region of the second chip and is interposed between the second chip and the plurality of support pieces.

5. The semiconductor device according to claim 4, wherein the first chip is apart from the second chip.

6. The semiconductor device according to claim 4 or 5, further comprising a bonding adhesive piece that is provided on one surface of the second chip and is interposed between the second chip and the plurality of support pieces.

7. The semiconductor device according to claim 6, wherein the first chip is apart from the bonding adhesive piece.

~~8. The semiconductor device according to claim 4 or 5, further comprising a bonding adhesive piece provided to cover at least a region of the second chip facing the first chip, wherein the first chip is apart from the bonding adhesive piece.~~

~~9. The semiconductor device according to claim 8, wherein the bonding adhesive piece continuously extends to a circumferential edge of the second chip from the region of the second chip and is interposed between the second chip and the plurality of support pieces.~~

~~108~~. The semiconductor device according to claim 6, wherein the first chip is in contact with the bonding adhesive piece.

~~119~~. The semiconductor device according to claim ~~108~~, wherein the bonding adhesive piece covers a region of the second chip facing the first chip, continuously extends to a circumferential edge of the second chip from the region of the second chip, and is interposed between the second chip and the plurality of support pieces.

~~1210~~. A support piece formation laminate film used in a manufacturing process 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 film comprising, in order:

a base material film;

an adhesive layer; and

a support piece formation film,

wherein the support piece formation film is a single-layer film comprising solely a thermosetting resin composition;

wherein the support piece comprises solely a thermosetting resin composition; and

wherein the support piece and the cured product thereof directly contacts

the substrate~~one of a film comprising a thermosetting resin layer; a film~~

~~comprising a layer in which at least a part of a thermosetting resin layer is~~

~~cured; a multi-layer film comprising a thermosetting resin layer and a resin~~

~~layer having a rigidity higher than a rigidity of the thermosetting resin layer;~~

~~and a multi-layer film comprising a thermosetting resin layer and a metal~~

~~layer having a rigidity higher than a rigidity of the thermosetting resin~~

~~layer.~~

~~13~~11. The support piece formation laminate film according to claim ~~12~~10, wherein a thickness of the support piece formation film is 5 to 180 μm .

~~14~~12. The support piece formation laminate film according to claim ~~12~~10 or ~~13~~11, wherein the adhesive layer is a pressure-sensitive adhesive layer or an ultraviolet-curable adhesive layer.

~~15~~12. The support piece formation laminate film according to any one of claims ~~12~~10 to ~~14~~11, wherein the thermosetting resin layer contains an epoxy resin.

~~16~~13. The support piece formation laminate film according to any one of claims ~~12~~10 to ~~15~~12, wherein the thermosetting resin layer contains an elastomer.

~~17.—The support piece formation laminate film according to any one of claims 12 to 16, wherein the resin layer is a polyimide layer.~~

~~18.—The support piece formation laminate film according to any one of claims 12 to 17, wherein the metal layer is a copper layer or an aluminum layer.~~

~~19~~14. A manufacturing method for a support piece formation laminate film used in a manufacturing process 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:

preparing an adhesive film comprising a base material film and an adhesive layer formed on one surface of the base material film; and

laminating a support piece formation film on a surface of the adhesive layer,

wherein the support piece formation film is a single-layer film comprising solely a thermosetting resin composition;

wherein the support piece comprises solely a thermosetting resin composition; and

wherein the support piece and the cured product thereof directly contacts the substrate~~one of a film comprising a thermosetting resin layer; a film comprising a layer in which at least a part of a thermosetting resin layer is cured; a multi-layer film comprising a thermosetting resin layer and a resin layer having a rigidity higher than a rigidity of the thermosetting resin layer; and a multi-layer film comprising a thermosetting resin layer and a metal layer having a rigidity higher than a rigidity of the thermosetting resin layer.~~

~~20.—A manufacturing method for a support piece formation laminate film used in a manufacturing process 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:~~

— ~~preparing a laminate film comprising a base material film, an~~

~~-adhesive layer and a thermosetting resin layer in this order; and~~
~~—bonding a resin layer or a metal layer having a rigidity higher than a rigidity of the thermosetting resin layer to a surface of the thermosetting resin layer.~~