CLAIMS

1. A temporary protective film for semiconductor sealing molding to temporarily protect a lead frame during sealing molding of forming a sealing layer that seals a semiconductor element mounted on the lead frame, comprising:

a support film; and

an adhesive layer provided on one surface or both surfaces of the support film and containing a resin,

wherein when the temporary protective film is attached to a lead frame having a die pad and an inner lead such that the adhesive layer comes into contact with the lead frame, a 90-degree peel strength between the adhesive layer and the lead frame is 5 N/m or higher at 25°C, and

when the temporary protective film is attached to the lead frame such that the adhesive layer comes into contact with the lead frame, a semiconductor element is mounted on a surface of the die pad, the surface being on the opposite side of the temporary protective film, subsequently the semiconductor element, the lead frame, and the temporary protective film are heated for 1 to 5 minutes at 400°C, and then a sealing layer for sealing the semiconductor element while being in contact with the adhesive layer is formed, a 90-degree peel strength between the adhesive layer and the lead frame as well as the sealing layer is 600 N/m or less at 180°C.

2. The temporary protective film for semiconductor sealing molding according to claim 1, wherein an elastic modulus at 200°C of the adhesive layer is 1 MPa or higher.

3. The temporary protective film for semiconductor sealing molding according to claim 1 or 2, wherein a thickness of the adhesive layer is 1 to 20 μm.

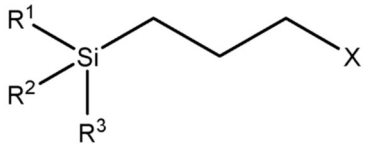
4. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 3,

wherein the adhesive layer further contains a silane coupling agent, and

a content of the silane coupling agent is more than 5% by mass and less than or equal to 35% by mass with respect to the total amount of the resin.

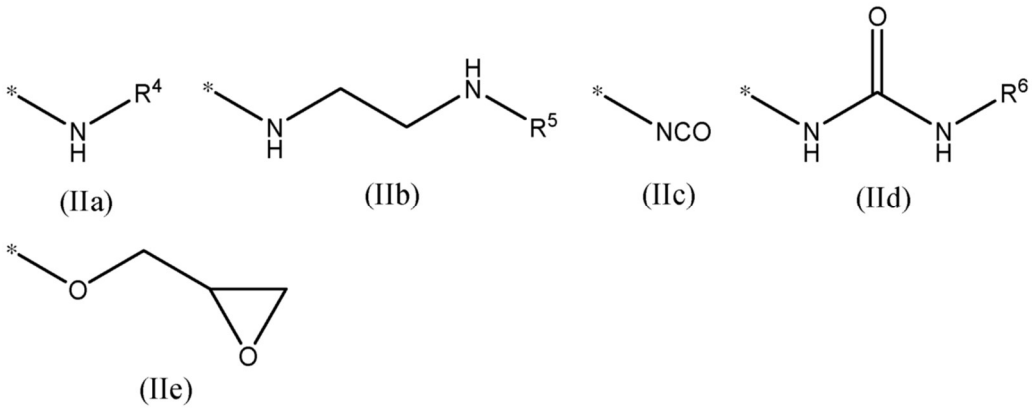
5. The temporary protective film for semiconductor sealing molding according to claim 4,

wherein the silane coupling agent is represented by the following Formula (I):



(I)

in the formula, R^1, R^2, and R^3 each independently represent an alkoxy group having 1 to 3 carbon atoms, an alkyl group having 1 to 6 carbon atoms, or an aryl group having 6 to 12 carbon atoms; X is represented by the following Formula (IIa), (IIb), (IIc), (IId), or (IIe):



in these formulae, R^4, R^5, and R^6 each independently represent an alkyl group having 1 to 6 carbon atoms, an aryl group having 6 to 12 carbon atoms, or a hydrogen atom; and the symbol * represents a site of bonding to a carbon atom.

6. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 5, wherein a glass transition temperature of the adhesive layer is 100°C to 300°C.

7. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 6, wherein the resin is a thermoplastic resin having an amide group, an ester group, an imide group, an ether group, or a sulfone group.

8. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 7, wherein a ratio of a thickness of the adhesive layer with respect to a thickness of the support film is 0.5 or less.

9. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 8, wherein the support film is a film of a polymer selected from the group consisting of an aromatic polyimide, an aromatic polyamide, an aromatic polyamideimide, an aromatic

polysulfone, an aromatic polyethersulfone, polyphenylene sulfide, an aromatic polyether ketone, polyallylate, an aromatic polyether ether ketone, and polyethylene naphthalate.

10. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 9, wherein a glass transition temperature of the support film is 200°C or higher.

11. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 10, wherein a thickness of the support film is 5 to 100 μm.

12. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 11, wherein a coefficient of linear expansion at 20°C to 200°C of the support film is 3.0×10^{-5} or less.

13. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 12, wherein a shrinkage factor of the support film when heated for 60 minutes at 200°C is 0.15% or less.

14. The temporary protective film for semiconductor sealing molding according to any one of claims 1 to 13,

wherein the adhesive layer is provided on one surface of the support film, and

the temporary protective film further includes a non-adhesive layer provided on a surface of the support film, the surface being on the opposite side of the surface provided with the adhesive layer.

15. A reel body, comprising a winding core and the temporary protective film for semiconductor sealing molding according to any one of claims 1 to 14 wound around the winding core.

16. A package, comprising the reel body according to claim 15; and a packaging bag accommodating the reel body.

17. A packing material, comprising the package according to claim 16; and a packing box accommodating the package.

18. A temporary protective film-attached lead frame, comprising:

a lead frame having a die pad and an inner lead; and

the temporary protective film according to any one of claims 1 to 14,

wherein the temporary protective film is attached to the lead frame in a direction in which the adhesive layer of the temporary protective film comes into contact with one surface of the lead frame.

19. A temporary protective film-attached sealing molded body, comprising:

a lead frame having a die pad and an inner lead;

a semiconductor element mounted on the die pad;

a wire connecting the semiconductor element and the inner lead;

a sealing layer sealing the semiconductor element and the wire; and

the temporary protective film according to any one of claims 1 to 14,

wherein the adhesive layer of the temporary protective film is attached to a surface of the lead frame, the surface being on the opposite side of the surface where the semiconductor element is mounted.

20. A method for producing a semiconductor device, comprising, in the following order:

a step of attaching the temporary protective film according to any

one of claims 1 to 14 on one surface of a lead frame having a die pad and an inner lead, in a direction in which the adhesive layer of the temporary protective film faces the lead frame;

a step of mounting a semiconductor element on a surface of the die pad, the surface being on the opposite side of the temporary protective film;

a step of providing a wire for connecting the semiconductor element and the inner lead;

a step of forming a sealing layer sealing the semiconductor element and the wire, and thereby obtaining a sealing molded body having a lead frame, a semiconductor element, and a sealing layer; and

a step of peeling off the temporary protective film from the sealing molded body.

21. A method according to claim 20,

wherein the lead frame has a plurality of die pads, and a semiconductor element is mounted on each of the plurality of die pads, and

the method further comprises a step of dividing the sealing molded body before or after peeling off the temporary protective film from the sealing molded body, and thereby obtaining semiconductor devices each having one die pad and one semiconductor element.