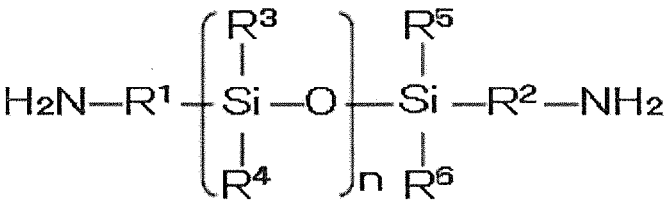
material is to be peeled.

[0007] In view of such circumstances, an object of the embodiments disclosed herein is to provide a resin composition whose production of a volatile portion due to decomposition or the like is small even at high temperatures greater than or equal to 250°C, and which has good tackiness at low temperatures less than or equal to 180°C, and whose increase in adhesive force is small even after passage through a heat treatment step so that the peeling can easily be carried out at room temperature, and a cured product and a laminate film that employ this resin composition.

Means of Solving the Problems

[0008] In an ~~first~~ aspect, there is provided a resin composition containing a polyimide-based resin and a methylol-based compound, the resin composition being characterized in that the polyimide-based resin has an acid dianhydride residue and a diamine residue, and has as the diamine residue at least a residue of a polysiloxane-based diamine represented by General formula (1) and a residue of an aromatic diamine having a hydroxyl group, and is also a cured product and a laminate film that employ this resin composition.

[0009][Chem. 1]



(1)

[0010] ~~(~~wherein n is a natural number, and an average value thereof calculated from an average molecular weight of the polysiloxane-based diamine is in a range of 5 to 30. R^1 and R^2 may be individually the same or different, indicating an alkylene group or a phenylene group whose carbon number is 1 to 30~~,~~ R^3 to R^6 may be individually the same or different, indicating an alkyl group, a phenyl group or a phenoxy group whose carbon number is 1 to 30.

wherein the methylol-based compound is a compound having two or more groups represented by General formula (6).

[Chem. 6]



(6)

wherein R^{47}, in the case where a plurality of R^{47} exists in the compound, may be individually the same or different, indicating hydrogen or an alkyl group whose carbon number is 1 to 10.~~)~~

[0010a] In another ~~second~~ aspect, there is provided a production method for a cured membrane ~~obtained by~~comprising the step of curing the resin composition as defined above.

[0010b] In another ~~third~~ aspect, there is provided a production method for a laminate film ~~obtained by~~comprising the step of laminating the resin composition as defined above on at least one surface of a heat resistant insulation film.

[0010c] In another ~~fourth~~ aspect, there is provided a production method for a semiconductor apparatus in which the resin composition as defined above is employed, comprising at least a step of processing a substrate for forming the semiconductor circuit so that the substrate becomes thinner, wherein the substrate for forming a semiconductor circuit is joined with a support substrate via at least one tackiness agent resin layer, and the tackiness agent resin layer is the resin composition, a step of subjecting the substrate for forming the semiconductor circuit to device processing, and a step of peeling the semiconductor circuit-formed substrate from the support substrate.

[0010d] In another ~~fifth~~ aspect, there is provided a production method for a semiconductor apparatus in which the laminate film as defined above is employed, comprising at least a step of processing a substrate for forming a semiconductor circuit so that the substrate becomes thinner, wherein the substrate for forming the semiconductor circuit is joined with a support substrate via at least one tackiness agent resin layer, and the tackiness agent resin layer is formed from the laminate film is employed, a step of subjecting the substrate for forming the semiconductor circuit to device processing, and a step of peeling the semiconductor circuit-formed substrate from the support substrate.

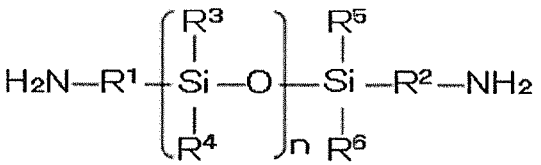
Advantageous Effect

[0011] According to the disclosure, it is possible to provide a highly heat resistant resin composition which exhibits good tackiness at low temperatures less than or equal to

Claims

[Claim 1] A resin composition containing a polyimide-based resin and a methylol-based compound, the resin composition being characterized in that the polyimide-based resin has an acid dianhydride residue and a diamine residue, and has as the diamine residue at least a residue of a polysiloxane-based diamine represented by General formula (1) and a residue of an aromatic diamine having a hydroxyl group.

[Chem. 1]



(1)

wherein (n is a natural number, and an average value thereof calculated from an average molecular weight of the polysiloxane-based diamine is in a range of 5 to 30. R^1 and R^2 may be individually the same or different, indicating an alkylene group or a phenylene group whose carbon number is 1 to 30. R^3 to R^6 may be individually the same or different, indicating an alkyl group, a phenyl group or a phenoxy group whose carbon number is 1 to 30.

wherein the methylol-based compound is a compound having two or more groups represented by General formula (6).

[Chem. 6]



(6)

wherein R^{47}, in the case where a plurality of R^{47} exists in the compound, may be individually the same or different, indicating hydrogen or an alkyl group whose carbon number is 1 to 10.)

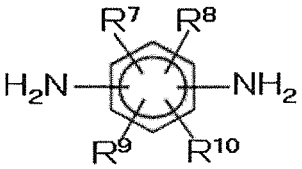
[Claim 2] The resin composition according to Claim 1, containing as the diamine residue the residue of the polysiloxane-based diamine represented by General formula (1) at greater than or equal to 40 mol% in a total amount of the diamine residue.

[Claim 3] The resin composition according to Claim 1, containing as the diamine residue the residue of the aromatic diamine having a hydroxyl group at 1 to 40 mol% in a total

amount of the diamine residue.

[Claim 4] The resin composition according to Claim 1 or 3, wherein the aromatic diamine having a hydroxyl group is an aromatic diamine represented by any one of General formulas (2) to (5).

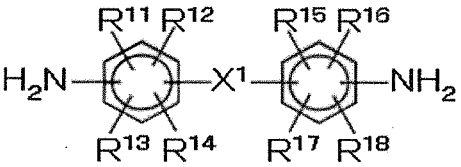
[Chem. 2]



(2)

(wherein Aat least one of R^7 to R^{10} is a hydroxyl group, and the others may be the same or different, indicating a group selected from a hydrogen atom, an alkyl group whose carbon number is 1 to 30, an alkoxy group whose carbon number 1 to 30, a halogen, a carboxyl group, a sulfone group, a nitro group, and a cyano group.)

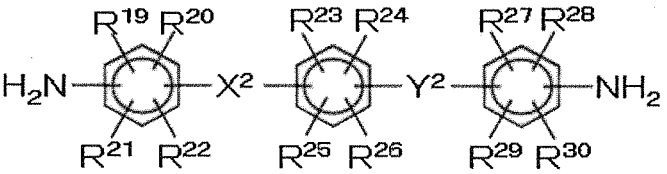
[Chem. 3]



(3)

(wherein X^1 indicates a group selected from a direct bond, O, S, SO, SO_2, CO, CH_2, $C(CH_3)_2$ and $C(CF_3)_2$. A at least one of R^{11} to R^{18} is a hydroxyl group, and the others may beare the same or different, indicating a group selected from a hydrogen atom, an alkyl group whose carbon number is 1 to 30, an alkoxy group whose carbon number 1 to 30, a halogen, a carboxyl group, a sulfone group, a nitro group, and a cyano group.)

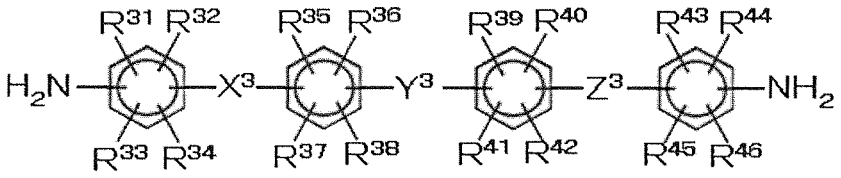
[Chem. 4]



(4)

(wherein X^2 and Y^2 may beare individually the same or different, indicating a group selected from a direct bond, O, S, SO, SO_2, CO, CH_2, $C(CH_3)_2$ and $C(CF_3)_2$. Aat least one of R^{19} to R^{30} is a hydroxyl group, and the others may be the same or different, indicating a group selected from a hydrogen atom, an alkyl group whose carbon number is 1 to 30, an alkoxy group whose carbon number 1 to 30, a halogen, a carboxyl group, a sulfone group, a nitro group, and a cyano group.)

[Chem. 5]



(5)

(wherein X^3, Y^3 and Z^3 may be individually the same or different, indicating a group selected from a direct bond, O, S, SO, SO_2, CO, CH_2, $C(CH_3)_2$ and $C(CF_3)_2$, A at least one of R^{31} to R^{46} is a hydroxyl group, and the others may be the same or different, indicating a group selected from a hydrogen atom, an alkyl group whose carbon number is 1 to 30, an alkoxy group whose carbon number 1 to 30, a halogen, a carboxyl group, a sulfone group, a nitro group, and a cyano group.)

[Claim 5] The resin composition according to Claim 1, wherein the methylol-based compound is a compound having two or more groups represented by General formula (6).

[Chem. 6]

$$-\{CH_2-O-R^{47}\} \qquad (6)$$

(R^{47}, in the case where a plurality of R^{47} exists in the compound, may be individually the same or different, indicating hydrogen or an alkyl group whose carbon number is 1 to 10.)

[Claim 65] The resin composition according Claim 1, wherein a content of the methylol-based compound is 1 to 20 parts by weight relative to 100 parts by weight of the polyimide-based resin.

[Claim 76] The resin composition according to Claim 1, wherein the acid dianhydride residue is a residue of an aromatic tetracarboxylic dianhydride.

[Claim 87] The resin composition according to Claim 1, wherein a glass transition temperature after curing is less than or equal to 40°C.

[Claim 98] A production method for a cured membrane obtained by comprising the step of curing the resin composition according to any one of Claims 1 to 87.

[Claim 109] A production method for a laminate film obtained by comprising the step of laminating the resin composition according to any one of Claims 1 to 8 7 on at least one surface of a heat resistant insulation film.

[Claim 1110] The laminate film according to Claim 109, wherein the surface of the heat

resistant insulation film has been subjected to a mold release treatment.

[Claim 11~~12~~] The laminate film according to Claim ~~10~~ 9 or ~~11~~10, obtained by further laminating a heat resistant insulation film having been subjected to a mold release treatment on a surface of the resin composition having been laminated on at least one surface of the heat resistant insulation film.

[Claim ~~13~~12] A production method for a semiconductor apparatus in which the resin composition according to any one of Claims 1 to ~~8~~ 7 is employed.

~~[Claim 14] The production method for the semiconductor apparatus according to Claim 13~~, comprising at least

a step of processing a substrate for forming the semiconductor circuit so that the substrate becomes thinner, wherein the substrate for forming a semiconductor circuit is joined with a support substrate via at least one tackiness agent resin layer, and the tackiness agent resin layer is the resin composition,

a step of subjecting the substrate for forming the semiconductor circuit to device processing,

and a step of peeling the semiconductor circuit-formed substrate from the support substrate.

[Claim ~~15~~13] A production method for a semiconductor apparatus in which the laminate film according to any one of Claims ~~10~~ 9 to ~~12~~ 11 is employed.

~~[Claim 16] The production method for the semiconductor apparatus according to Claim 15~~, comprising at least

a step of processing a substrate for forming a semiconductor circuit so that the substrate becomes thinner, wherein the substrate for forming the semiconductor circuit is joined with a support substrate via at least one tackiness agent resin layer, and the tackiness agent resin layer is formed from the laminate film is employed,

a step of subjecting the substrate for forming the semiconductor circuit to device processing,

and a step of peeling the semiconductor circuit-formed substrate from the support substrate.