CLAIMS

[Claim 1]

A production method for a semiconductor device using a laminate comprising a substrate 1 with laser transparency, a resin film 1, and a resin film 2 stacked in this order wherein:

the absorbance of the resin film 1 converted to a film thickness of 1.0 μm is 0.4 or more and 5.0 or less at a wavelength in the range of 200 to 1,100 nm;

the surface of the resin film 2 opposite to the one in contact with the resin film 1 has an adhesive strength of 0.02 N/cm or more and 0.3 N/cm or less,

the method comprising the steps of mounting semiconductor elements on the surface of resin film 2 opposite to the one in contact with the resin film 1, disposing the laminate mounted with semiconductor elements so that its semiconductor elements plane faces a substrate 2 and a subsequent step for applying a laser beam through the substrate 1 with laser transparency present in the laminate to transfer the semiconductor elements to the substrate 2.

[Claim 2]

A production method for a semiconductor device using a laminate comprising a substrate 1 with laser transparency, a resin film 1, a resin film 2, and semiconductor elements stacked in this order wherein:

the absorbance of the resin film 1 converted to a film thickness of 1.0 μm is 0.4 or more and 5.0 or less at a wavelength in the range of 200 to 1,100 nm;

the adhesive strength at the face where the resin film 2 and the semiconductor elements are in contact with each other is 0.02 N/cm or more and 0.3 N/cm or less,

the method comprising the steps of disposing the laminate so that its semiconductor elements plane faces a substrate 2 and a subsequent step for applying a laser beam through the substrate 1 with laser transparency present in the laminate to transfer the semiconductor elements to the substrate 2.

[Claim 3]

A production method as set forth in either claim 1 or 2 wherein the absorbance of the resin film 1 converted to a film thickness of 1.0 μm is 0.4 or more and 5.0 or less at a wavelength selected from 248 nm, 266 nm, 308 nm, 355 nm, 532 nm, and 1,064 nm.

[Claim 4]

A production method as set forth in any one of claims 1 to 3 wherein the absorbance of the resin film 1 converted to a film thickness of 1.0 μm is 0.4 or more and 5.0 or less at a wavelength selected from 248 nm, 266 nm, and 355 nm.

[Claim 5]

A laminate as set forth in any one of claims 1 to 4 having an indentation hardness H2 of 2 MPa or more and 500 MPa or less as measured by making an indentation in the direction from the resin film 2 toward the substrate 1 and also satisfying the relation H1 > H2 where H1 is the indentation hardness that is measured by making an indentation in the direction

from the resin film 1 toward the substrate 1 after removing the resin film 2 from the laminate.

[Claim 6]

A production method as set forth in any one of claims 1 to 5 wherein the value of (t1 + t2), where t1 (μm) and t2 (μm) are the thickness of the resin film 1 and that of the resin film 2, respectively, is 1.0 μm or more and 30 μm or less, and the ratio of t1/t2 is 0.1 or more and 5.0 or less.

[Claim 7]

A production method as set forth in any one of claims 1 to 6 wherein the resin film 1 has an elongation at break of 2.0% or more and 30% or less.

[Claim 8]

A production method as set forth in any one of claims 1 to 7 wherein the indentation hardness H1 that is measured by making an indentation in the direction from the resin film 1 toward the substrate 1 is 50 MPa or more and 1,000 MPa or less.

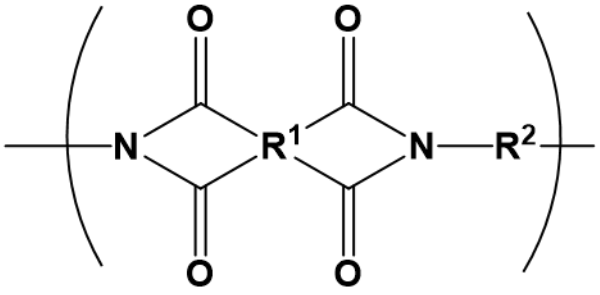
[Claim 9]

A production method as set forth in any one of claims 1 to 8 wherein the resin film 2 has an elongation at break of 100% or more and 1,000% or less.

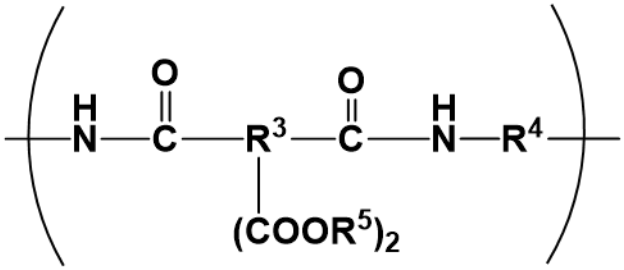
[Claim 10]

A production method as set forth in any one of claims 1 to 9 wherein the resin film 1 comprises one or more selected from the group consisting of a polyimide having a structure as represented by the formula (1), a polyimide precursor having a structure as represented by the formula (2), a polybenzoxazole having a structure as represented by the formula (3), a polybenzoxazole precursor having a structure as represented by the formula (4), and copolymers thereof:

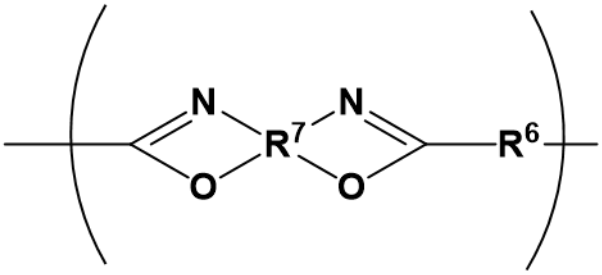
[Chemical compound 1]



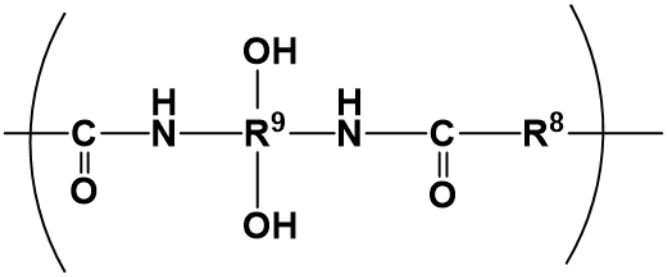
(1)



(2)



(3)



(4)

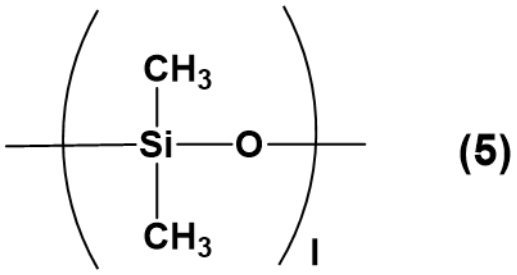
wherein in the formulae (1) to (4), R^1, R^3, R^7, and R^9 each independently represent a tetravalent organic group having 6 to 40 carbon atoms; R^2, R^4, R^6, and R^8 each independently represent a divalent organic group having 2 to 40 carbon atoms; and R^5 represents a hydrogen atom or a monovalent organic group having 1 to 20 carbon atoms.

[Claim 11]

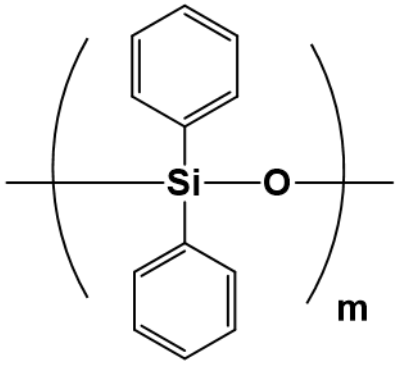
A production method as set forth in any one of claims 1 to 10 wherein the resin contained in the resin film 2 comprises one or more structures selected from the group consisting of a

dimethylsiloxane structure as represented by the formula (5), a diphenylsiloxane structure as represented by the formula (6), an alkylene glycol structure as represented by the formula (7), and an alkylene structure as represented by the formula (8):

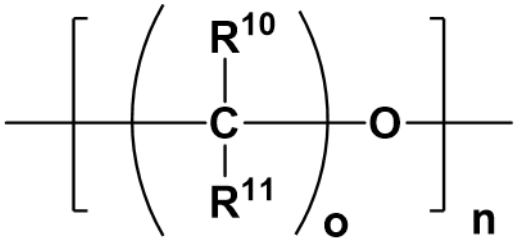
[Chemical compound 2]



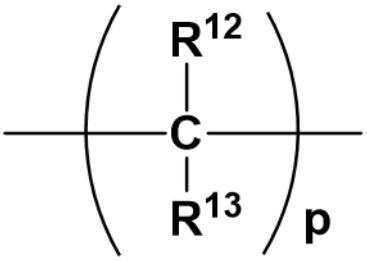
(5)



(6)



(7)



(8)

wherein in the formulae (5) to (8), R^{10} to R^{13} each independently represent a hydrogen atom

or a monovalent organic group having 1 to 20 carbon atoms; l, m, and n each independently represent an integer of 4 to 40; p represents an integer of 10 to 40; and o represents an integer of 1 to 16.

[Claim 12]

A production method as set forth in any one of claims 1 to 11 wherein the resin contained in the resin film 2 is polyimide siloxane.

[Claim 13]

A production method as set forth in any one of claims 1 to 12 wherein the resin film 2 contains a crosslinking agent.

[Claim 14]

A production method as set forth in any one of claims 1 to 13 wherein the resin film 2 has a 1% weight loss temperature of 300°C or more.

[Claim 15]

A production method for a semiconductor device as set forth in any one of claims 1 to 14 wherein the laser beam has a wavelength of 248 nm, 266 nm, 308 nm, 355 nm, 532 nm, or 1,064 nm.

[Claim 16]

A production method for a semiconductor device as set forth in any one of claims 1 to 15, wherein the substrate 2 is a circuit board.