SUMMARY

PROBLEMS TO BE SOLVED

[0005]

However, the adhesive for temporary bonding as in Patent Document 1, which can only be peeled off by heating, has problems that the solder bump is dissolved during the heating step for peeling, that an adhesive force during the semiconductor processing step is reduced and the adhesive is peeled off during the step, or conversely an adhesive force is increased and the adhesive cannot be peeled off.

[0006]

The adhesive for temporary bonding as in Patent Document 2, which is peeled off by a mechanical force applied at room temperature, is free from the above-mentioned problems. However, two types of adhesive layers have to be formed, which imposes a considerable burden on the process. The adhesive for temporary bonding as in Patent Document 3 is an adhesive which produces one type of adhesive layer, and which is peeled off by a mechanical force applied at room temperature. The cycloolefin-based material, however, has a problem that the material is decomposed in the semiconductor step at high temperatures. Further, in the case of applying the adhesive for temporary bonding, the wafer edge portion is sometimes ridged to cause defects at the time of bonding the wafers

together.

[0007]

In view of such a situation, an object of the embodiments disclosed herein is to provide a laminate film having an adhesive layer for temporary bonding, which is capable of making a semiconductor circuit formation substrate and a support substrate adhere to each other with one type of adhesive, produces no ridge in the wafer edge portion, is excellent in heat resistance, does not undergo a change in the adhesive force in the course of the production process of a semiconductor device or the like, and can then be peeled off by a mechanical force applied at room temperature under mild conditions or by being dissolved in a rework solvent or the like.

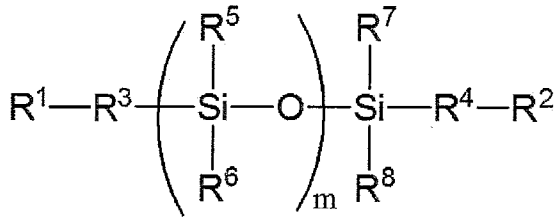
SOLUTIONS TO THE PROBLEMS

[0008]

That is, the present disclosure provides a laminate film for temporary bonding, including at least three layers of (A) a protective film layer, (B) an adhesive layer, and (C) a support film layer, wherein the adhesive layer (B) contains at least a siloxane polymer represented by the general formula (1) or a compound represented by the general formula (2):

[0009]

[Chemical Formula 1]



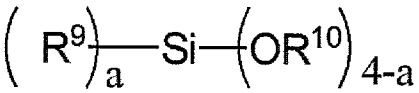
(1)

[0010]

wherein m is an integer of 10 or more and 100 or less, R^1 and R^2 may be the same or different and each represent a monovalent organic group, R^3 and R^4 may be the same or different and each represent an alkylene group having 1 to 30 carbon atoms or a phenylene group, and R^5 to R^8 may be the same or different and each represent an alkyl group having 1 to 30 carbon atoms, an alkenyl group, an alkoxy group, a phenyl group, or a phenoxy group; or

[0011]

[Chemical Formula 2]



(2)

[0012]

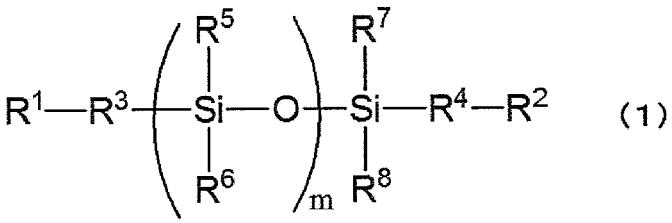
wherein R^9 represents a monovalent organic group having 2 to 20 carbon atoms and 1 to 3 nitrogen atoms, R^{10} represents hydrogen, an alkyl group having 1 to 20 carbon atoms, or an aromatic group, and a represents an integer of 1 to 4.

[0012a]

In an aspect, there is provided a laminate film for temporary bonding, comprising at least three layers of (A) a protective

film layer, (B) an adhesive layer, and (C) a support film layer, wherein the adhesive layer (B) contains at least a siloxane polymer represented by the general formula (1) and a polyimide resin

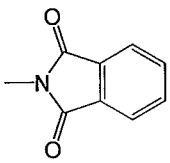
[Chemical Formula 1]



(1)

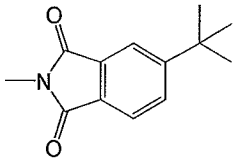
wherein m is an integer of 10 or more and 100 or less, R^1 and R^2 may be the same or different and each represent an amino group or a monovalent organic group represented by the general formula (4) or (5), R^3 and R^4 may be the same or different and each represent an alkylene group having 1 to 30 carbon atoms or a phenylene group, and R^5 to R^8 may be the same or different and each represent an alkyl group having 1 to 30 carbon atoms, an alkenyl group, an alkoxy group, a phenyl group, or a phenoxy group; or

[Chemical Formula 2]



(4)

[Chemical Formula 3]



(5)

[0012b]

In another aspect, there is provided a method for producing a substrate workpiece including the laminate film for temporary bonding as defined above, the method comprising the steps of:

peeling off the protective film layer (A), and

laminating the laminate film for temporary bonding from which the protective film layer (A) is peeled off on (D) a semiconductor circuit formation substrate with the adhesive layer (B) placed in between.

[0012c]

In another aspect, there is provided a method for producing a semiconductor device using a substrate workpiece produced by the method as defined above, the method comprising at least one of the steps of:

thinning the semiconductor circuit formation substrate (D),

subjecting the semiconductor circuit formation substrate (D) to device processing,

peeling off the support film layer (C) and the adhesive layer (B) from the semiconductor circuit formation substrate (D), and

washing off the adhesive layer attached to the

semiconductor circuit formation substrate (D) with a solvent.

EFFECTS

[0013]

The present disclosure can provide a laminate film for temporary bonding which is excellent in heat resistance, capable of providing a flat film even at the wafer edge portion, and capable of making a semiconductor circuit formation substrate and a support substrate or a support film layer adhere to each other with one type of adhesive, and which can be peeled off at room temperature under mild conditions.

EMBODIMENTS OF THE INVENTION

[0014]

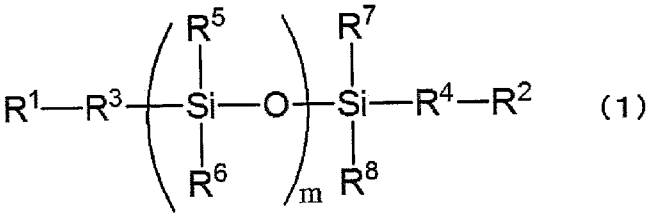
The laminate film for temporary bonding of the present invention includes at least three layers of (A) a protective film layer, (B) an adhesive layer, and (C) a support film layer, and the adhesive layer (B) contains at least a siloxane polymer represented by the general formula (1) or a compound represented by the general formula (2).

[0015]

In one aspect of the laminate film for temporary bonding of the present invention, the adhesive layer (B) contains a siloxane polymer represented by the general formula (1):

[0016]

[Chemical Formula 3]



(1)