Claims

1. An adhesive composition for use in debonding with light irradiation, which composition can achieve debonding through irradiation with light, ~~characterized in that~~wherein:

the adhesive composition comprises an adhesive component (S) containing a component (A) which is cured through hydrosilylation and a light-absorbing organic compound (X); and

the light-absorbing organic compound (X) contains, in the molecule thereof, one or more aromatic rings, one or more rings each containing a heteroatom forming the ring, and one or more groups selected from among a carbonyl group and a thiocarbonyl group,

wherein the carbon atom of the carbonyl or thiocarbonyl group constitutes the ring which contains a heteroatom in the ring.

2. An adhesive composition for use in debonding with light irradiation~~ according to claim 1~~, which composition can achieve debonding through irradiation with light, wherein:

the adhesive composition comprises an adhesive component (S) containing a component (A) which is cured through hydrosilylation and a light-absorbing organic compound (X); and

the light-absorbing organic compound (X) contains, in the molecule thereof, one or more aromatic rings, one or more rings each containing a heteroatom forming the ring, and one or more carbonyl or thiocarbonyl groups wherein the carbon atom of the carbonyl or thiocarbonyl group constitutes the ring which contains a heteroatom in the ring.

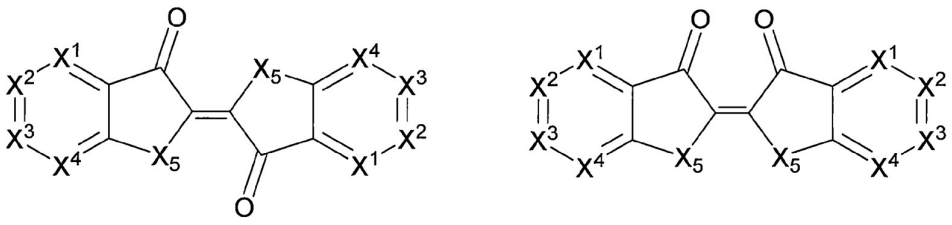
3. An adhesive composition for use in debonding with light irradiation according to claim 1 or 2, wherein the light-absorbing organic compound (X) contains, in the

molecule thereof, two or more aromatic rings, two or more rings each containing a heteroatom forming the ring, and two or more carbonyl or thiocarbonyl groups.

4. An adhesive composition for use in debonding with light irradiation according to claim 3, wherein the aromatic rings are condensed with the rings each containing a heteroatom forming the ring~~, and the carbon atoms of the carbonyl or thiocarbonyl groups form the rings each containing a heteroatom forming the ring~~.

5. An adhesive composition for use in debonding with light irradiation according to claim 1 or 2, wherein the light-absorbing organic compound (X) is represented by the following formula (T1-1) or (T2-1):

[F1]



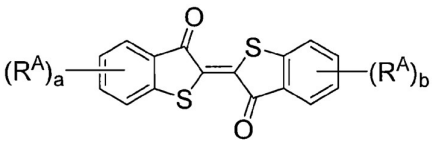
(T1-1) (T2-1)

(wherein each of X^1 to X^4 represents a carbon atom forming an aromatic ring, and is bonded to the adjacent carbon atoms forming the aromatic ring and to a hydrogen atom, a halogen atom, or a monovalent organic group; and X^5 each represents a heteroatom).

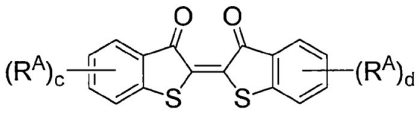
6. An adhesive composition for use in debonding with light irradiation according to claim 1 or 2, wherein the light-absorbing organic compound (X) is a thioindigo derivative or an isothioindigo derivative.

7. An adhesive composition for use in debonding with light irradiation according to claim 6, wherein the thioindigo derivative or the isothioindigo derivative is represented by the following formula (T1-2) or (T2-2):

[F2]



(T1-2)

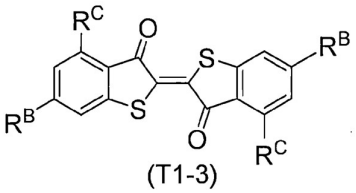


(T2-2)

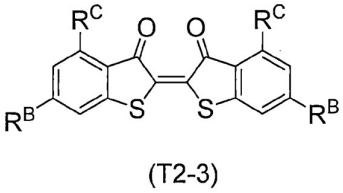
(wherein R^A is a substituent atom or group of a benzene ring, and represents a halogen atom, an alkyl group, an alkenyl group, an alkynyl group, or an aryl group; and each of a to d represents an integer of 0 to 4).

8. An adhesive composition for use in debonding with light irradiation according to claim 7, wherein the thioindigo derivative or the isothioindigo derivative is represented by the following formula (T1-3) or (T2-3):

[F3]



(T1-3)



(T2-3)

(wherein each of R^B and R^C represents a hydrogen atom, a halogen atom, or an alkyl group).

~~9. An adhesive composition for use in debonding with light irradiation according to any one of claims 1 to 8, wherein the adhesive component (S) contains a component (A) which is cured through hydrosilylation.~~

~~10~~9. An adhesive composition for use in debonding with light irradiation according to any one of claims 1 to ~~9~~8, wherein the adhesive composition further comprises a component (B) containing at least one component selected from the group consisting of a component containing an epoxy-modified polyorganosiloxane, a component containing a methyl-group-containing polyorganosiloxane, and a component containing a phenyl-group-containing polyorganosiloxane.

~~11~~10. An adhesive composition for use in debonding with light irradiation according to claim ~~9~~8 or ~~10~~9,

wherein the component (A) which is cured through hydrosilylation comprises a polysiloxane (A1) having one or more units selected from the group consisting of a siloxane unit represented by SiO_2 (unit Q), a siloxane unit represented by $R^1R^2R^3SiO_{1/2}$ (unit M), a siloxane unit represented by $R^4R^5SiO_{2/2}$ (unit D), and a siloxane unit represented by $R^6SiO_{3/2}$ (unit T) (wherein each of R^1 to R^6 is a group or an atom bonded to a silicon atom and represents an alkyl group, an alkenyl group, or a hydrogen atom) and a platinum group metal catalyst (A2); and

the polysiloxane (A1) comprises

a polyorganosiloxane (a1) having one or more units selected from the group consisting of a siloxane unit represented by SiO_2 (unit Q'), a siloxane unit represented by $R^1'R^2'R^3'SiO_{1/2}$ (unit M'), a siloxane unit represented by $R^4'R^5'SiO_{2/2}$ (unit D'), and a siloxane unit represented by $R^6'SiO_{3/2}$ (unit T'), and at least one unit selected from the group consisting of unit M', unit D', and unit T' (wherein each of R^1' to R^6' is a group bonded to a silicon atom and represents an alkyl group or an alkenyl group, and at least one of R^1' to R^6' is an alkenyl group), and

a polyorganosiloxane (a2) having one or more units selected from the group consisting of a siloxane unit represented by SiO_2 (unit Q''), a siloxane unit represented by $R^1''R^2''R^3''SiO_{1/2}$ (unit M''), a siloxane unit represented by $R^4''R^5''SiO_{2/2}$ (unit D''), and a siloxane unit represented by $R^6''SiO_{3/2}$ (unit T''), and at least one unit selected from the group consisting of unit M'', unit D'', and unit T'' (wherein each of R^1'' to R^6'' is a group or an atom bonded to a silicon atom and represents an alkyl group or a hydrogen atom, and at least one of R^1'' to R^6'' is a hydrogen atom).

~~12~~11. A laminate comprising a first substrate formed of a semiconductor-forming substrate, a second substrate formed of a support substrate which allows passage of laser light, and an adhesive layer, wherein

the adhesive layer is a cured film formed from an adhesive composition for use in debonding with light irradiation as recited in any one of claims 1 to ~~11~~10.

~~13~~12. A method for producing a laminate, the method comprising

a first step of applying an adhesive composition for use in debonding with light irradiation as recited in any one of claims 1 to ~~11~~10 onto a surface of a first or second substrate, to thereby form an adhesive coating layer; and

a step of adhering the first substrate to the second substrate by the mediation of the adhesive coating layer; applying a load to the first substrate and the second substrate in a thickness direction, to thereby closely bind the first substrate, the adhesive coating layer, and the second substrate, while at least one of a heat treatment and a reduced pressure treatment is performed; and then performing a post-heat treatment.

~~14~~13. A debonding method comprising irradiating a laminate produced through a laminate production method as recited in claim ~~13~~12 with laser light from the second substrate side of the laminate, to thereby debond the second substrate.

~~15~~14. A debonding method according to claim ~~14~~13, wherein the laser light has a wavelength of 190 nm to 600 nm.