Claims

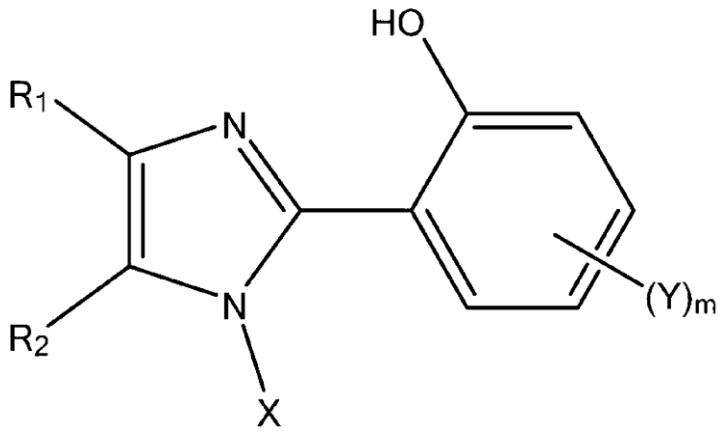
[Claim 1] An epoxy resin composition comprising

component (A): an epoxy resin, and

component (B): a compound represented by the following formula (1) and/or a compound represented by the following formula (2), wherein

the component (A) comprises at least one trifunctional or higher polyfunctional epoxy resin, and

when a temperature T°C that satisfies $130 \leq T \leq 150$ is kept constant, a slope α of a line satisfies $690 \leq \alpha \leq 1000$, the line being obtained by plotting Lnt (ordinate) against 1/T (abscissa) wherein a time for a viscosity to reach 10000 Pa·s based on a time when the temperature T°C has been attained is defined as t minute:



・・・・(1)

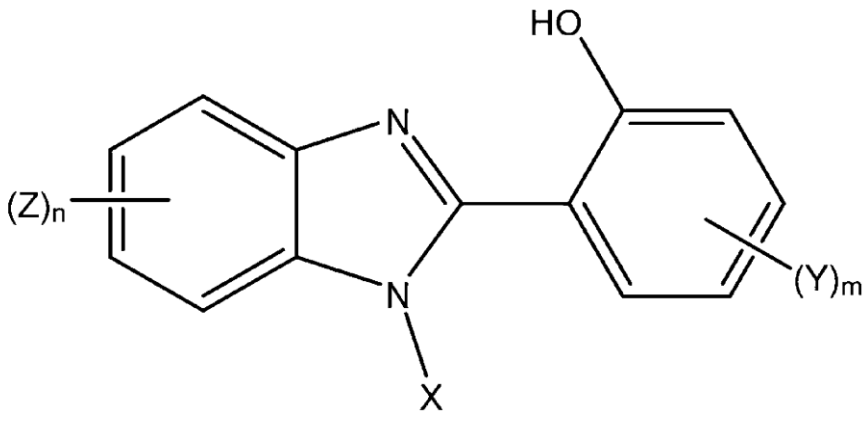
wherein

R_1 and R_2 are each independently any one member selected from the group consisting of a hydrogen atom, a hydroxy group, a carboxy group, a cyano group, a nitro group, a halogen atom, an alkyl group having 1 to 20 carbon atoms and optionally having a substituent, and a cycloalkyl group having 6 to 20 carbon atoms and optionally having a substituent, R_1 and R_2 are the same as or different from each

other, and R_1 and R_2 are optionally bonded to each other to form a condensed ring having no aromaticity;

X is any one member selected from the group consisting of a hydrogen atom, an alkyl group having 1 to 20 carbon atoms and optionally having a substituent, an alkenyl group having 2 to 20 carbon atoms and optionally having a substituent, an aralkyl group having 7 to 20 carbon atoms and optionally having a substituent, and a heteroarylalkyl group having 4 to 20 carbon atoms and optionally having a substituent;

Y is any one member selected from the group consisting of a hydrogen atom, a halogen atom, a hydroxy group, a carboxy group, a cyano group, a nitro group, an alkyl group having 1 to 20 carbon atoms and optionally having a substituent, an alkoxy group having 1 to 20 carbon atoms and optionally having a substituent, an alkenyl group having 2 to 20 carbon atoms and optionally having a substituent, an aryl group having 6 to 20 carbon atoms and optionally having a substituent, an aryloxy group having 6 to 20 carbon atoms and optionally having a substituent, and an acyl group having 1 to 20 carbon atoms and optionally having a substituent, a plurality of Y moieties, if present, are the same as or different from each other, and two or more Y moieties are optionally bonded to each other to form a monocyclic ring or a condensed ring; and m is an integer of 1 to 4,



・・・・(2)

wherein

X is any one member selected from the group consisting of a hydrogen atom, an alkyl group having 1 to 20 carbon atoms and optionally having a substituent, an alkenyl group having 2 to 20 carbon atoms and optionally having a substituent, an aralkyl group having 7 to 20 carbon atoms and optionally having a substituent, and a heteroarylalkyl group having 4 to 20 carbon atoms and optionally having a substituent;

each of Y and Z is any one member selected from the group consisting of a hydrogen atom, a halogen atom, a hydroxy group, a carboxy group, a cyano group, a nitro group, an alkyl group having 1 to 20 carbon atoms and optionally having a substituent, an alkoxy group having 1 to 20 carbon atoms and optionally having a substituent, an alkenyl group having 2 to 20 carbon atoms and optionally having a substituent, an aryl group having 6 to 20 carbon atoms and optionally having a substituent, an aryloxy group having 6 to 20 carbon atoms and optionally having a substituent, and an acyl group having 1 to 20 carbon atoms and optionally having a substituent, Y and Z are the same as or different from each other, and two or more Y moieties or two or more Z moieties are optionally bonded to each other to form a monocyclic ring or a condensed ring; and m and n are each independently an integer of 1 to 4.

[Claim 2] The epoxy resin composition according to claim 1, wherein

the component (A) further comprises a bifunctional or lower functional epoxy resin.

[Claim 3] The epoxy resin composition according to claim 2, wherein

a blending ratio (mass ratio) between the trifunctional or higher polyfunctional epoxy resin and the bifunctional or lower functional epoxy resin is in a range of 1:0.1 to 1:10.

[Claim 4] The resin composition according to any one of claims 1 to 3, wherein the component (A) comprises an epoxy resin having an aromatic ring.

[Claim 5] The resin composition according to any one of claims 1 to 4, wherein the component (A) comprises an epoxy resin having no aromatic ring.

[Claim 6] The epoxy resin composition according to any one of claims 1 to 5, wherein

in the component (B),

Y in the formula (1) is one member selected from the group consisting of a hydrogen atom, a hydroxy group, a carboxy group, an alkoxy group having 1 to 20 carbon atoms and having no substituent, an alkyl group having 1 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, an alkoxy group having 1 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, an aryl group having 6 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, an aryloxy group having 6 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, and an acyl group having 1 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, and

each of Y and Z in the formula (2) is one member selected from the group consisting of a hydrogen atom, a hydroxy group, a carboxy group, an alkoxy group having 1 to 20 carbon atoms and having no substituent, an alkyl group having 1 to

20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, an alkoxy group having 1 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, an aryl group having 6 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, an aryloxy group having 6 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent, and an acyl group having 1 to 20 carbon atoms and having a hydroxy group and/or a carboxy group as a substituent.

[Claim 7] The epoxy resin composition according to any one of claims 1 to 5, wherein

in the component (B),

the compound represented by the formula (1) is any member selected from the group consisting of 2-(2-hydroxyphenyl)imidazole, 2-(2-hydroxyphenyl)-4(5)-methylimidazole, 4-ethyl-(2-hydroxyphenyl)-5-methylimidazole, (2-hydroxyphenyl)-4-isopropyl-5-methylimidazole, 4-butyl-(2-hydroxyphenyl)-5-methylimidazole, and 2-(2-hydroxy-3(5)-methoxyphenyl)imidazole,

and/or

the compound represented by the formula (2) is any member selected from the group consisting of 2-(2-hydroxyphenyl)benzimidazole, 2-(2-hydroxy-3(5)-methoxyphenyl)benzimidazole, 2-(1-hydroxynaphthalen-2-yl)benzimidazole, 2-(2-hydroxynaphthalen-1-yl)benzimidazole, and 2-(2-hydroxyphenyl)benzimidazole-6-carboxylic acid.

[Claim 8] The epoxy resin composition according to any one of claims 1 to 7, further comprising

component (C): a filler.

[Claim 9] The epoxy resin composition according to any one of claims 1 to 8, further comprising

component (E): a thermoplastic resin.

[Claim 10] The epoxy resin composition according to any one of claims 1 to 9, further comprising

component (G): a silane coupling agent.

[Claim 11] The epoxy resin composition according to claim 10, wherein the component (G) is an aminosilane-based coupling agent.

[Claim 12] The epoxy resin composition according to any one of claims 1 to 11, further comprising

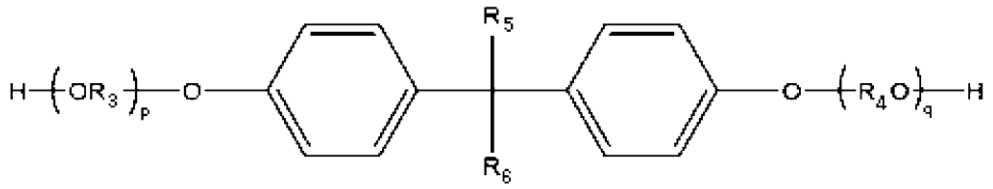
component (H): a non-epoxy group-terminated compound having a polyalkylene oxide structure.

[Claim 13] The epoxy resin composition according to claim 12, wherein

the component (H) has a terminal hydroxy group.

[Claim 14] The epoxy resin composition according to claim 13, wherein

the component (H) is a compound represented by the following formula (3):



... (3)

wherein R_3 and R_4 are each independently an alkyl group having 1 to 12 carbon atoms, and R_3 and R_4 are the same as or different from each other; p and q are each independently an integer of 1 or larger; and R_5 and R_6 are each independently one member selected from the group consisting of a hydrogen atom, an alkyl group having 1 to 20 carbon atoms and optionally having a substituent, a cycloalkyl group having 6 to 20 carbon atoms and optionally having a substituent, and an aryl group having 6 to 20 carbon atoms and optionally having a substituent, and R_5 and R_6 are the same as or different from each other.

[Claim 15] A resin paste comprising

the epoxy resin composition according to any one of claims 1 to 14.

[Claim 16] A resin film having

a support, and

a resin layer comprising the epoxy resin composition according to any one of claims 1 to 14 on the support.

[Claim 17] The resin film according to claim 16, further having

a protective layer.

[Claim 18] A cured product prepared by curing the epoxy resin composition according to any one of claims 1 to 14.

[Claim 19] Semiconductor equipment having a layer of the cured product according to claim 18.