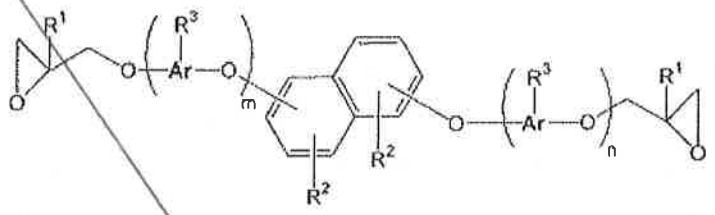
[CLAIMS]

[1] A resin composition comprising: an epoxy resin (A); a maleimide compound (B); a curing agent (C); and an inorganic filler (D),

the epoxy resin (A) being represented by formula (I):



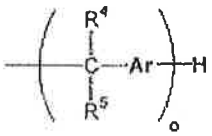
(I)

wherein

Ar's each independently represent a naphthylene or phenylene group, provided that at least one hydrogen atom in both the naphthylene and phenylene groups is optionally substituted by an alkyl group having 1 to 4 carbon atoms or a phenylene group;

R^1 represents a hydrogen atom or a methyl group;

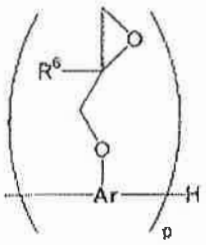
R^2's each independently represent a hydrogen atom, an alkyl group having 1 to 4 carbon atoms, or an aralkyl group represented by formula (II):



(II)

wherein R^4 and R^5 each independently represent a hydrogen atom or a methyl group; Ar represents a phenylene or naphthylene group, provided that 1 to 3 hydrogen atoms in the phenylene or naphthylene group are optionally nuclearly substituted by an alkyl group having 1 to 4 carbon atoms; and o represents a real number of 0.1 to 4 on average; and

R^3 represents a hydrogen atom, an aralkyl group represented by formula (II), or an epoxy group-containing aromatic hydrocarbon group represented by formula (III):



(III)

wherein R^6 represents a hydrogen atom or a methyl group; Ar represents a naphthylene group, provided that at least one hydrogen atom in the naphthylene group is optionally substituted by an alkyl group having 1 to 4 carbon atoms, an aralkyl group, or a phenylene group; and p is an integer of 1 or 2;

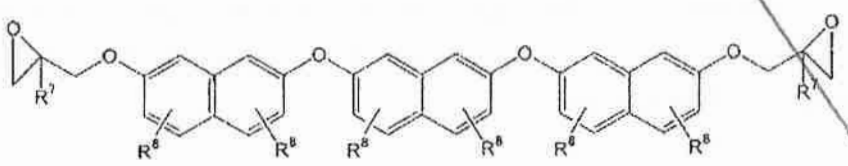
m and n each are an integer of 0 to 4, provided that m and n are not simultaneously 0 (zero); and

the position of binding to the naphthalene structure site may be any of the 1- to 8-positions.

[2] The resin composition according to claim 1, wherein Ar in formula (I) is a naphthylene group, at least one hydrogen atom of which is optionally substituted by an alkyl group having 1 to 4 carbon atoms or a phenylene group.

[3] The resin composition according to claim 1, wherein m and n in formula (I) are an integer of 0 to 2, provided that m and n are not simultaneously 0 (zero).

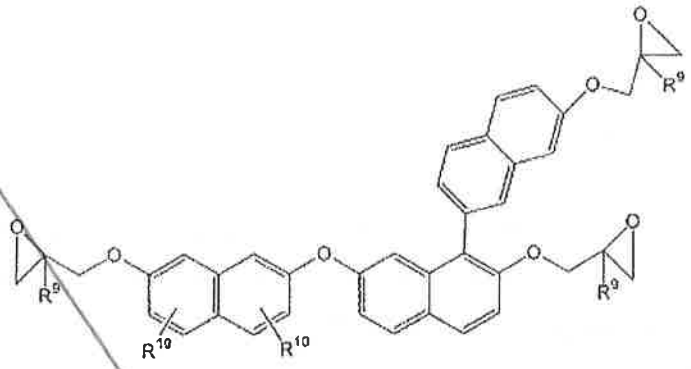
[4] The resin composition according to claim 1, wherein the epoxy resin (A) is represented by general formula (IV) or (V):



(IV)

wherein R^7 represents a hydrogen atom or a methyl group; and R^8's

each independently represent a hydrogen atom, an alkyl group having 1 to 4 carbon atoms, an aralkyl group represented by formula (II):

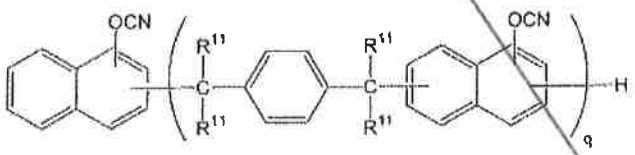


(V)

wherein R^9 represents a hydrogen atom or a methyl group; and R^{10}s each independently represent a hydrogen atom, an alkyl group having 1 to 4 carbon atoms, or an aralkyl group represented by formula (II).

[5] The resin composition according to any one of claims 1 to 4, wherein the curing agent (C) comprises a cyanate ester resin (C1).

[6] The resin composition according to claims 5, wherein the cyanate ester resin (C1) is represented by formula (VI):

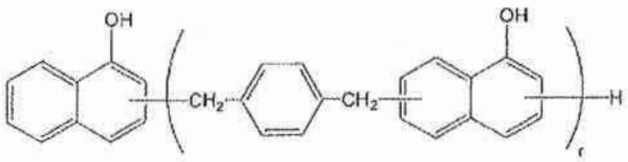


(VI)

wherein R^{11} represents a hydrogen atom or a methyl group; and q is an integer of 1 to 10 on average.

[7] The resin composition according to any one of claims 1 to 6, wherein the curing agent (C) further comprises a phenolic resin (C2).

[8] The resin composition according to claim 7, wherein the phenolic resin (C2) is represented by formula (VII):



(VII)

wherein r is an integer of 1 or more.

[9] The resin composition according to any one of claims 1 to 8, wherein the epoxy resin (A) is contained in an amount of 5 to 60 parts by weight based on 100 parts by weight in total of the epoxy resin (A), the maleimide compound (B), and the curing agent (C).

[10] The resin composition according to any one of claims 1 to 9, wherein the maleimide compound (B) is contained in an amount of 3 to 50 parts by weight based on 100 parts by weight in total of the epoxy resin (A), the maleimide compound (B), and the curing agent (C).

[11] The resin composition according to claim 5, 6, 9, or 10, wherein the cyanate ester resin (C1) is contained in an amount that meets a requirement of CN/Ep of 0.7 to 2.5 wherein CN represents the number of cyanate groups in the cyanate ester resin (C1); and Ep represents the number of epoxy groups in the epoxy resin (A).

[12] The resin composition according to claim 7, 8, 9, or 10, wherein the phenolic resin (C2) is contained in an amount that meets a requirement of OH/Ep of 0.7 to 2.5 wherein OH represents the number of phenol groups in the phenolic resin (C2); and Ep represents the number of epoxy groups in the epoxy resin (A).

[13] The resin composition according to any one of claims 1 to 12, wherein the inorganic filler (D) is contained in an amount of 50 to 200 parts by weight based on 100 parts by weight in total of the epoxy resin (A), the maleimide compound (B), and the curing agent (C).

[14] A prepreg comprising: a base material; and a resin composition according to any one of claims 1 to 13 impregnated into or coated on the base

material.

[15] A laminated sheet comprising a cured product of a prepreg according to claim 14.

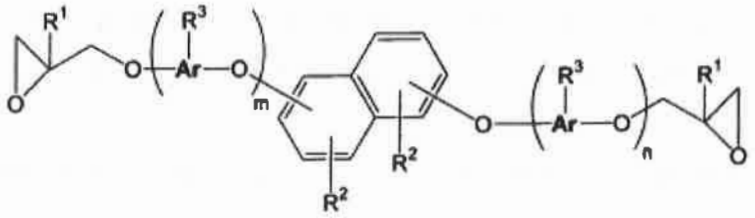
[16] A metal foil-clad laminated sheet comprising: a cured product of a stack of a prepreg according to claim 14 and a metal foil provided on the prepreg.

[CLAIMS]

[1] A prepreg comprising:

a base material; and a resin composition impregnated into or coated on the base material wherein the resin composition comprises: an epoxy resin (A); a maleimide compound (B); a curing agent (C); and an inorganic filler (D),

the epoxy resin (A) being represented by formula (I):



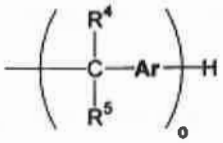
(I)

wherein

Ar's each independently represent a naphthylene or phenylene group, provided that at least one hydrogen atom in both the naphthylene and phenylene groups is optionally substituted by an alkyl group having 1 to 4 carbon atoms or a phenylene group;

R^1 represents a hydrogen atom or a methyl group;

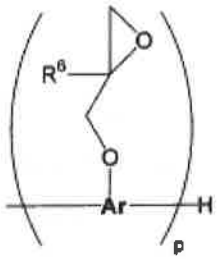
R^2's each independently represent a hydrogen atom, an alkyl group having 1 to 4 carbon atoms, or an aralkyl group represented by formula (II):



(II)

wherein R^4 and R^5 each independently represent a hydrogen atom or a methyl group; Ar represents a phenylene or naphthylene group, provided that 1 to 3 hydrogen atoms in the phenylene or naphthylene group are optionally nuclearly substituted by an alkyl group having 1 to 4 carbon atoms; and o represents a real number of 0.1 to 4 on average; and

R^3 represents a hydrogen atom, an aralkyl group represented by formula (II), or an epoxy group-containing aromatic hydrocarbon group represented by formula (III):



(III)

wherein R^6 represents a hydrogen atom or a methyl group; Ar represents a naphthylene group, provided that at least one hydrogen atom in the naphthylene group is optionally substituted by an alkyl group having 1 to 4 carbon atoms, an aralkyl group, or a phenylene group; and p is an integer of 1 or 2;

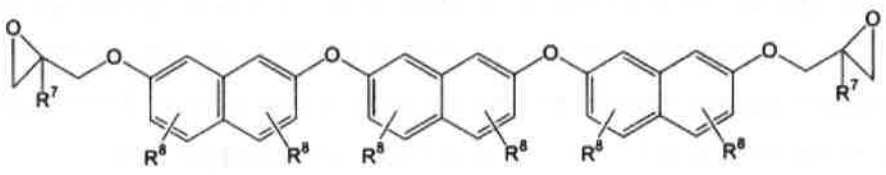
m and n each are an integer of 0 to 4, provided that m and n are not simultaneously 0 (zero); and

the position of binding to the naphthalene structure site may be any of the 1- to 8-positions.

[2] The prepreg according to claim 1, wherein Ar in formula (I) is a naphthylene group, at least one hydrogen atom of which is optionally substituted by an alkyl group having 1 to 4 carbon atoms or a phenylene group.

[3] The prepreg according to claim 1, wherein m and n in formula (I) are an integer of 0 to 2, provided that m and n are not simultaneously 0 (zero).

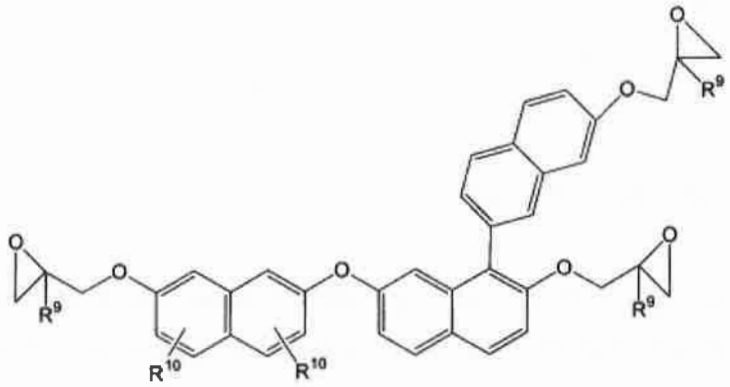
[4] The prepreg according to claim 1, wherein the epoxy resin (A) is represented by general formula (IV) or (V):



(IV)

wherein R^7 represents a hydrogen atom or a methyl group; and R^8's each independently represent a hydrogen atom, an alkyl group having 1 to 4

carbon atoms, an aralkyl group represented by formula (II):

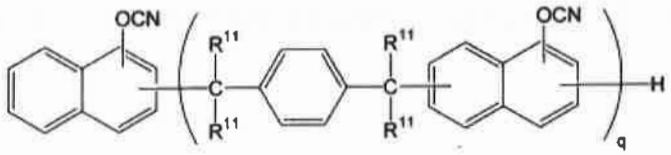


(V)

wherein R^9 represents a hydrogen atom or a methyl group; and R^{10}'s each independently represent a hydrogen atom, an alkyl group having 1 to 4 carbon atoms, or an aralkyl group represented by formula (II).

[5] The prepreg according to any one of claims 1 to 4, wherein the curing agent (C) comprises a cyanate ester resin (C1).

[6] The prepreg according to claims 5, wherein the cyanate ester resin (C1) is represented by formula (VI):

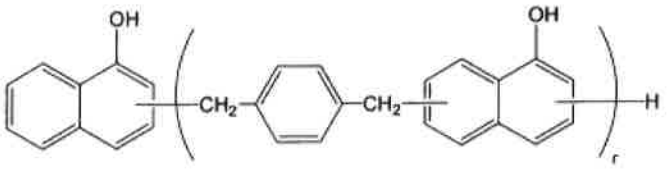


(VI)

wherein R^{11} represents a hydrogen atom or a methyl group; and q is an integer of 1 to 10 on average.

[7] The prepreg according to any one of claims 1 to 6, wherein the curing agent (C) further comprises a phenolic resin (C2).

[8] The prepreg according to claim 7, wherein the phenolic resin (C2) is represented by formula (VII):



(VII)

wherein r is an integer of 1 or more.

[9] The prepreg according to any one of claims 1 to 8, wherein the epoxy resin (A) is contained in an amount of 5 to 60 parts by weight based on 100 parts by weight in total of the epoxy resin (A), the maleimide compound (B), and the curing agent (C).

[10] The prepreg according to any one of claims 1 to 9, wherein the maleimide compound (B) is contained in an amount of 3 to 50 parts by weight based on 100 parts by weight in total of the epoxy resin (A), the maleimide compound (B), and the curing agent (C).

[11] The prepreg according to claim 5, 6, 9, or 10, wherein the cyanate ester resin (C1) is contained in an amount that meets a requirement of CN/Ep of 0.7 to 2.5 wherein CN represents the number of cyanate groups in the cyanate ester resin (C1); and Ep represents the number of epoxy groups in the epoxy resin (A).

[12] The prepreg according to claim 7, 8, 9, or 10, wherein the phenolic resin (C2) is contained in an amount that meets a requirement of OH/Ep of 0.7 to 2.5 wherein OH represents the number of phenol groups in the phenolic resin (C2); and Ep represents the number of epoxy groups in the epoxy resin (A).

[13] The prepreg according to any one of claims 1 to 12, wherein the inorganic filler (D) is contained in an amount of 50 to 200 parts by weight based on 100 parts by weight in total of the epoxy resin (A), the maleimide compound (B), and the curing agent (C).

[14] A laminated sheet comprising a cured product of a prepreg according to claim 1.

[15] A metal foil-clad laminated sheet comprising: a cured product of a stack of a prepreg according to claim 1 and a metal foil provided on the prepreg.