CLAIMS

1. A negative type photosensitive resin composition comprising:

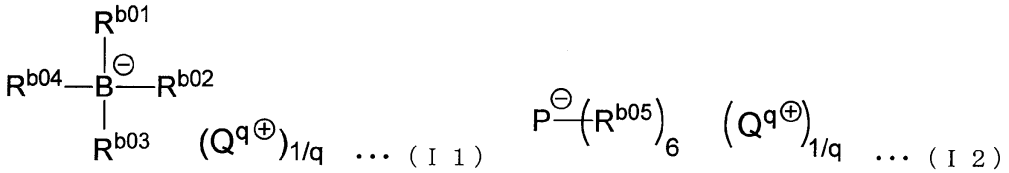
an epoxy group-containing resin (A);

a metal oxide (M); and

a cationic polymerization initiator (I),

wherein the content of the epoxy group-containing resin (A) is in a range of 70% to 90% by mass with respect to the total content of the epoxy group-containing resin (A), the cationic polymerization initiator (I), and the metal oxide (M), and

wherein the cationic polymerization initiator (I) contains one or more selected from the group consisting of a compound represented by Formula (I1) and a compound represented by Formula (I2):



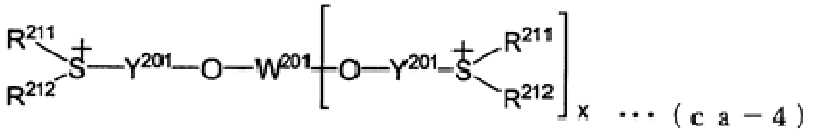
... (I1)

... (I2)

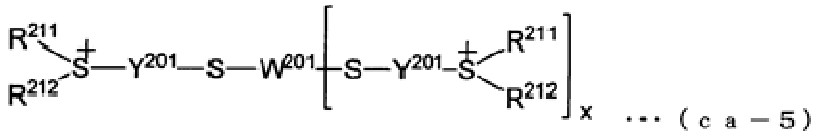
wherein R^{b01} to R^{b04} each independently represent an aryl group which may have a substituent or a fluorine atom, R^{b05} represents a fluorinated alkyl group which may have a substituent or a fluorine atom, a plurality of R^{b05}'s may be the same as or different from one another, q represents an integer of 1 or greater, and Q^{q+}'s each independently represent a q-valent organic cation represented by any one of Formula (Ca-1) to (Ca-5), and q represents 1,



(ca-1) (ca-2) (ca-3)



... (ca-4)



... (ca-5)

wherein R^{201} to R^{207}, and R^{211} and R^{212} each independently represent an aryl group which may have a substituent, a heteroaryl group which may have a substituent, an alkyl group which may have a substituent, or an alkenyl group which may have a substituent, R^{201} to R^{203}, R^{206} and R^{207}, and R^{211} and R^{212} may be bonded to one another to form a ring together with a sulfur atom in the formulae, R^{208} and R^{209} each independently represent a hydrogen atom or an alkyl group having 1 to 5 carbon atoms, R^{210} represents an aryl group which may have a substituent, an alkyl group which may have a substituent, an alkenyl group which may have a substituent, or a -SO2-containing cyclic group which may have a substituent, L^{201} represents -C(=O)- or -C(=O)-O-, Y^{201}'s each independently represent an arylene group, an alkylene group, or an alkenylene group, x represents 1 or 2, and W^{201} represents an (x+1)-valent linking group.

2. The negative type photosensitive resin composition according to claim 1,

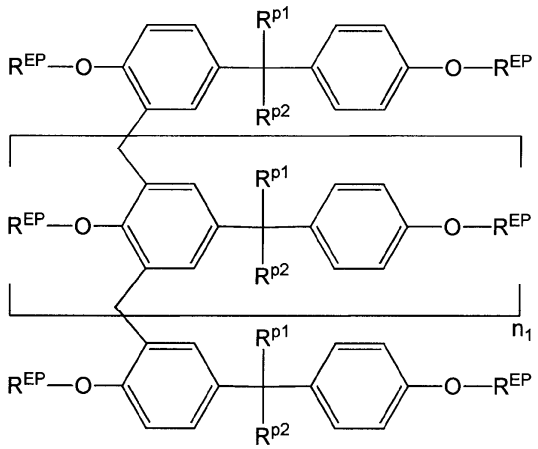
wherein a content of the cationic polymerization initiator (I) is in a range of 1 to 5 parts by mass with respect to 100 parts by mass which is a total amount of the epoxy group-containing resin (A) and the metal oxide (M).

3. The negative type photosensitive resin composition according to claim 1 or 2,

wherein a content of the metal oxide (M) is in a range of 10 to 30 parts by mass with respect to 100 parts by mass of the epoxy group-containing resin (A).

4. The negative type photosensitive resin composition according to any one of claims 1 to 3,

wherein the epoxy group-containing resin (A) contains a resin represented by Formula (A1):



... (A1)

wherein R^{p1} and R^{p2} each independently represent a hydrogen atom or an alkyl group having 1 to 5 carbon atoms, a plurality of R^{p1}'s may be the same as or different from one another, a plurality of R^{p2}'s may be the same as or different from one another,

n_1 represents an integer of 1 to 5, R^{EP} represents an epoxy group-containing group, and a plurality of R^{EP}'s may be the same as or different from one another.

5. The negative type photosensitive resin composition according to any one of claims 1 to 4,

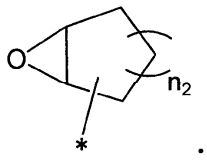
wherein the metal oxide (M) consists of particles having a volume average particle diameter of 5 to 40 nm.

6. The negative type photosensitive resin composition according to any one of claims 1 to 5, further comprising:

a silane coupling agent.

7. The negative type photosensitive resin composition according to any one of claims 1 to 6,

wherein the epoxy group-containing resin (A) contains a compound having a partial structure represented by Formula (m1):

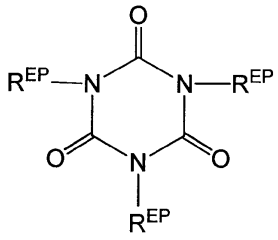


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wherein n_2 represents an integer of 1 to 4, and the symbol "*" represents a bonding site.

8. The negative type photosensitive resin composition according to any one of claims 1 to 7,

wherein the epoxy group-containing resin (A) contains a compound represented by Formula (m2):



... (m 2)

wherein R^{EP} represents an epoxy group-containing group, and a plurality of R^{EP}'s may be the same as or different from one another.

9. The negative type photosensitive resin composition according to any one of claims 1 to 8, which is developed by an organic developing solution containing an organic solvent to form a negative type pattern.

10. A photosensitive resist film which is obtained by laminating a base film, a photosensitive resin film formed using the negative type photosensitive resin composition according to any one of claims 1 to 9, and a cover film in that order.

11. A pattern forming method comprising:

a step of forming a photosensitive resin film on a support using the negative type photosensitive resin composition according to any one of claims 1 to 9;

a step of exposing the photosensitive resin film; and

a step of developing the exposed photosensitive resin film to form a negative type pattern.

12. A pattern forming method comprising:

a step of forming a photosensitive resin film on a support using the photosensitive resist film according to claim 10;

a step of exposing the photosensitive resin film; and

a step of developing the exposed photosensitive resin film to form a negative type pattern.

13. The pattern forming method according to claim 11 or 12,

wherein the exposed photosensitive resin film is developed by an organic developing solution containing an organic solvent.

14 A cured film which is obtained by curing the negative type photosensitive resin composition according to any one of claims 1 to 9.

15. A method of producing a cured film, comprising:

a step of forming a photosensitive resin film on a support using the negative type photosensitive resin composition according to any one of claims 1 to 9; and

a step of curing the photosensitive resin film to obtain a cured film.

16. A method of producing a cured film, comprising:

a step of forming a photosensitive resin film on a support using the photosensitive resist film according to claim 10; and

a step of curing the photosensitive resin film to obtain a cured film.