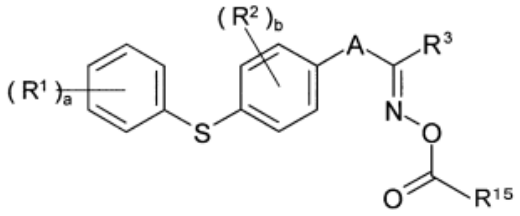
insufficient and thus conduction failure easily occurs. Therefore, formation of rectangular pattern is required.

[0007] The present disclosure has been made in view of the above circumstances. An object of the present disclosure is to provide a photosensitive resin composition that does not require heat treatment at high temperature and allows the pattern shape to be processed in a rectangular shape even in thick film processing and a photosensitive resin composition film, an insulating film, and an electronic component using the same.

Solution to Problem

[0008] To solve the problem described above and to achieve the object, a photosensitive resin composition according to the present disclosure includes: an alkali-soluble polyimide (a), an unsaturated bond-containing compound (b), a thermally crosslinkable compound (c), and a photopolymerization initiator (d) having a structure represented by the following general formula (1):

[0009]

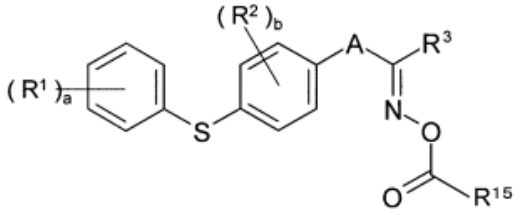


(1)

in the general formula (1), R^1 to R^3 each independently represents a halogen atom, a hydroxy group, a carboxy group, a nitro group, a cyano group, $-NR^{13}R^{14}$, a monovalent hydrocarbon group having a carbon number of 1 to 20, an acyl group having a carbon number of 1 to 20, or an alkoxy group having a carbon number of 1 to 20; R^{13} and R^{14} each independently represents a hydrogen atom or an alkyl group having a carbon number of 1 to 10; at least some of the hydrogen atoms in the hydrocarbon group, the acyl group,

and the alkoxy group are optionally substituted with halogen atoms, hydroxy groups, carboxy groups, nitro groups, cyano groups, or $-NR^{13}R^{14}$s; the hydrocarbon group and the hydrocarbon group in the alkoxy group are optionally divided by an ether bond, a thioether bond, an ester bond, a thioester bond, an amide bond, or a urethane bond; R^{15} represents an alkyl group having a carbon number of 1 to 5; a represents an integer of 0 to 5 and b represents an integer of 0 to 4; and A represents CO or a direct bond.

[0009a] In an aspect, there is provided a photosensitive resin composition comprising: an alkali-soluble polyimide (a) comprising a structure derived from a tetracarboxylic acid dianhydride and a structure derived from a diamine, an unsaturated bond-containing compound (b), a thermally crosslinkable compound (c), and a photopolymerization initiator (d) having a structure represented by the following general formula (1):



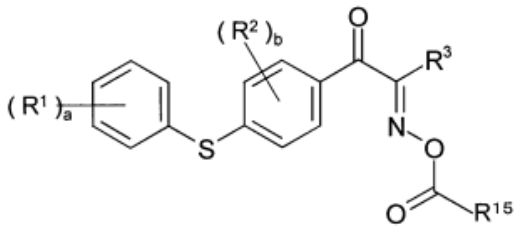
(1)

in the general formula (1), R^1 to R^3 each independently represents a halogen atom, a hydroxy group, a carboxy group, a nitro group, a cyano group, $-NR^{13}R^{14}$, a monovalent hydrocarbon group having a carbon number of 1 to 20, an acyl group having a carbon number of 1 to 20, or an alkoxy group having a carbon number of 1 to 20; R^{13} and R^{14} each independently represents a hydrogen atom or an alkyl group having a carbon number of 1 to 10; at least some of the hydrogen atoms in the hydrocarbon group, the acyl group, and the alkoxy group are optionally substituted with halogen atoms, hydroxy groups, carboxy groups, nitro groups,

cyano groups, or $-NR^{13}R^{14}$s; the hydrocarbon group and the hydrocarbon group in the alkoxy group are optionally divided by an ether bond, a thioether bond, an ester bond, a thioester bond, an amide bond, or a urethane bond; R^{15} represents an alkyl group having a carbon number of 1 to 5; a represents an integer of 0 to 5 and b represents an integer of 0 to 4; and A represents CO or a direct bond.

[0010] In the photosensitive resin composition according to the present disclosure, the photopolymerization initiator (d) has a structure represented by the following general formula (1-1):

[0011]

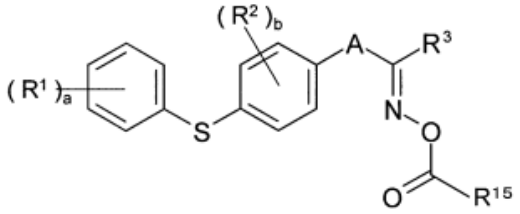


(1-1)

in the general formula (1-1), R^1 to R^3 each independently represents a halogen atom, a hydroxy group, a carboxy group, a nitro group, a cyano group, $-NR^{13}R^{14}$, a monovalent hydrocarbon group having a carbon number of 1 to 20, an acyl group having a carbon number of 1 to 20, or an alkoxy group having a carbon number of 1 to 20; R^{13} and R^{14} each independently represents a hydrogen atom or an alkyl group having a carbon number of 1 to 10; at least some of the hydrogen atoms in the hydrocarbon group, the acyl group, and the alkoxy group are optionally substituted with halogen atoms, hydroxy groups, carboxy groups, nitro groups, cyano groups, or $-NR^{13}R^{14}$s; the hydrocarbon group and the hydrocarbon group in the alkoxy group are optionally divided by an ether bond, a thioether bond, an ester bond,

CLAIMS

1. A photosensitive resin composition comprising: an alkali-soluble polyimide (a) comprising a structure derived from a tetracarboxylic acid dianhydride and a structure derived from a diamine, an unsaturated bond-containing compound (b), a thermally crosslinkable compound (c), and a photopolymerization initiator (d) having a structure represented by the following general formula (1):

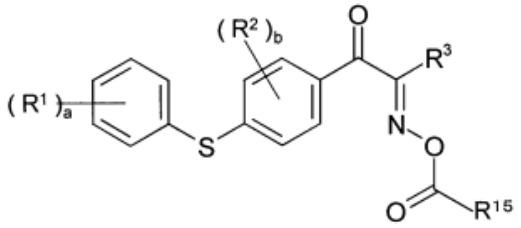


(1)

in the general formula (1), R^1 to R^3 each independently represents a halogen atom, a hydroxy group, a carboxy group, a nitro group, a cyano group, $-NR^{13}R^{14}$, a monovalent hydrocarbon group having a carbon number of 1 to 20, an acyl group having a carbon number of 1 to 20, or an alkoxy group having a carbon number of 1 to 20; R^{13} and R^{14} each independently represents a hydrogen atom or an alkyl group having a carbon number of 1 to 10; at least some of the hydrogen atoms in the hydrocarbon group, the acyl group, and the alkoxy group are optionally substituted with halogen atoms, hydroxy groups, carboxy groups, nitro groups, cyano groups, or $-NR^{13}R^{14}$s; the hydrocarbon group and the hydrocarbon group in the alkoxy group are optionally divided by an ether bond, a thioether bond, an ester bond, a thioester bond, an amide bond, or a urethane bond; R^{15} represents an alkyl group having a carbon number of 1 to 5; a represents an integer of 0 to 5 and b represents an integer of 0 to 4; and A represents CO or a direct bond.

2. The photosensitive resin composition according to

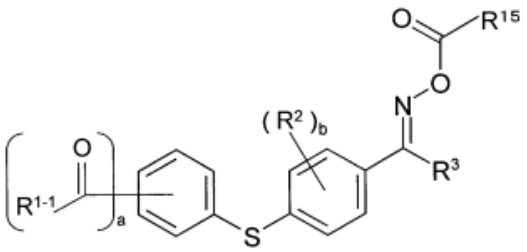
claim 1, wherein the photopolymerization initiator (d) has a structure represented by the following general formula (1-1):



(1-1)

in the general formula (1-1), R^1 to R^3 each independently represents a halogen atom, a hydroxy group, a carboxy group, a nitro group, a cyano group, $-NR^{13}R^{14}$, a monovalent hydrocarbon group having a carbon number of 1 to 20, an acyl group having a carbon number of 1 to 20, or an alkoxy group having a carbon number of 1 to 20; R^{13} and R^{14} each independently represents a hydrogen atom or an alkyl group having a carbon number of 1 to 10; at least some of the hydrogen atoms in the hydrocarbon group, the acyl group, and the alkoxy group are optionally substituted with halogen atoms, hydroxy groups, carboxy groups, nitro groups, cyano groups, or $-NR^{13}R^{14}$s; the hydrocarbon group and the hydrocarbon group in the alkoxy group are optionally divided by an ether bond, a thioether bond, an ester bond, a thioester bond, an amide bond, or a urethane bond; R^{15} represents an alkyl group having a carbon number of 1 to 5; a represents an integer of 0 to 5 and b represents an integer of 0 to 4.

3. The photosensitive resin composition according to claim 1, wherein the photopolymerization initiator (d) has a structure represented by the following general formula (1-2):



(1−2)

in the general formula (1-2), R^{1-1} represents a halogen atom, a hydroxy group, a carboxy group, a nitro group, a cyano group, $-NR^{13}R^{14}$, a monovalent hydrocarbon group having a carbon number of 1 to 20, or an alkoxy group having a carbon number of 1 to 20; R^{13} and R^{14} in R^{1-1} each independently represents a hydrogen atom or an alkyl group having a carbon number of 1 to 10; at least some of the hydrogen atoms in the hydrocarbon group and the alkoxy group in R^{1-1} are optionally substituted with halogen atoms, hydroxy groups, carboxy groups, nitro groups, cyano groups, or $-NR^{13}R^{14}$s; the hydrocarbon group and the hydrocarbon group in the alkoxy group in R^{1-1} are optionally divided by an ether bond, a thioether bond, an ester bond, a thioester bond, an amide bond, or a urethane bond; R^2 and R^3 each independently represents a halogen atom, a hydroxy group, a carboxy group, a nitro group, a cyano group, $-NR^{13}R^{14}$, a monovalent hydrocarbon group having a carbon number of 1 to 20, an acyl group having a carbon number of 1 to 20, or an alkoxy group having a carbon number of 1 to 20; R^{13} and R^{14} in R^2 and R^3 each independently represents a hydrogen atom or an alkyl group having a carbon number of 1 to 10; at least some of the hydrogen atoms in the hydrocarbon group, the acyl group, and the alkoxy group in R^2 and R^3 are optionally substituted with halogen atoms, hydroxy groups, carboxy groups, nitro groups, cyano groups, or $-NR^{13}R^{14}$s; the hydrocarbon group and the hydrocarbon group in the alkoxy group in R^2 and R^3 are optionally divided by an ether bond, a thioether bond, an ester bond, a thioester

bond, an amide bond, or a urethane bond; R^{15} represents an alkyl group having a carbon number of 1 to 5; a represents an integer of 0 to 5 and b represents an integer of 0 to 4.

4. The photosensitive resin composition according to any one of claims 1 to 3, wherein when an absorbance before exposure at a wavelength of 405 nm is determined to be Abs(0) and an absorbance after exposure at a wavelength of 405 nm is determined to be Abs(1), the photosensitive resin composition satisfies Abs(1)/Abs(0) < 1.25.

5. The photosensitive resin composition according to any one of claims 1 to 4, wherein the alkali-soluble polyimide (a) has at least one of a carboxy group, a phenolic hydroxy group, a sulfonic acid group, and a thiol group at an end of a main chain.

6. The photosensitive resin composition according to any one of claims 1 to 5, wherein the alkali-soluble polyimide (a) has at least one of a carboxy group, a phenolic hydroxy group, a sulfonic acid group, and a thiol group in a side chain.

7. The photosensitive resin composition according to claim 6, wherein the alkali-soluble polyimide (a) has the phenolic hydroxy group in the side chain.

8. The photosensitive resin composition according to any one of claims 1 to 7, wherein the alkali-soluble polyimide (a) is a polyimide having a residue of a siloxanediamine.

9. The photosensitive resin composition according to claim 8, wherein the alkali-soluble polyimide (a) is a

polyimide containing the residue of the siloxane diamine in an amount of 1% by mole or more and 10% by mole or less in total diamine residues.

10. The photosensitive resin composition according to any one of claims 1 to 9, wherein an imidation ratio of the alkali-soluble polyimide (a) is 70% or more.

11. A photosensitive resin composition film comprising the photosensitive resin composition according to any one of claims 1 to 10.

12. An insulating film comprising a cured product of the photosensitive resin composition according to any one of claims 1 to 10.

13. An electronic component comprising the insulating film according to claim 12.

14. The electronic component according to claim 13, comprising a hollow structure body including a roof part made of the insulating film.