addition of a naphthoquinonediazide and addition of a chelate compound are separately described.

Patent Document 1: JP H9-152625A (claim 1)

Patent Document 2: JP 2001-281853A (claim 1)

Patent Document 3: JP H5-165214A (claim 1)

Patent Document 4: JP 2002-341521A (claim 1)

Patent Document 5: JP 2006-178436A (claim 1)

Patent Document 6: JP 2009-211033A (claim 1)

Patent Document 7: JP H07-331173A (claim 1)

Patent Document 8: JP 2007-308688A (claim 1)

Patent Document 9: JP 2007-246877A (claims 1 to 6)

Patent Document 10: WO2007-049440 (paragraphs [0040], [0041] and [0054])

SUMMARY ~~OF THE INVENTION~~

PROBLEMS TO BE SOLVED ~~BY THE INVENTION~~

[0012] However, since the transparent planarization film of Patent Document 1 is produced by using an acrylic resin as a material, the film does not have sufficient heat resistance.

[0013] Further, those acrylic resins described in Patent Documents 2, 3 and 4 do not have sufficient heat resistance and chemical resistance; therefore, there are problems in that the resulting cured film becomes colored and the transparency of the film is impaired by a high-temperature treatment of substrate, high-temperature film formation on a transparent electrode or treatment with various etching solutions; and that the conductivity of the resulting electrode is deteriorated by degassing during high-temperature film formation. In addition, since these acrylic materials generally have low sensitivity, their film productivity is low, so that a material having higher sensitivity is desired. Moreover, with advancements of displays, the

use of a naphthoquinonediazide and a chelate compound at the same time. Furthermore, Patent Document 10 offers absolutely no description from which it can be easily inferred that, by using a naphthoquinonediazide and a chelate compound at the same time, a material which has positive photosensitivity and satisfies both wet-heat resistance and adhesion in development is attained.

[0021] As described in the above, despite there is a demand for a positive photosensitive material having high transparency, high wet-heat resistance and good adhesion in development, a technology therefor has not been established until now.

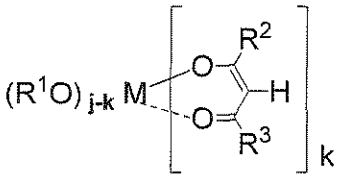
[0022] The present disclosure~~invention~~ was made in view of the above-described circumstances and an object of the embodiments disclosed herein~~abject of the present invention~~ is to provide a photosensitive composition which has high heat resistance and high transparency as well as excellent adhesion in development and wet-heat resistance. Another object of the embodiments disclosed herein~~present invention~~ is to provide a cured film which is formed from the above-described photosensitive composition and used as a planarization film for a TFT substrate, an interlayer insulation film, a protective film or insulation film for a touch panel, a core or clad material or a lens material. Yet another object of the embodiments disclosed herein~~present invention~~ is to provide an element comprising the cured film, such as a display element, a semiconductor element, a solid-state image sensing device or an optical waveguide.

MEANS FOR SOLVING THE PROBLEMS

[0023] In order to solve the above-described problems, the positive photosensitive composition according to the present disclosure~~invention~~ has the following constitution. That is, the positive photosensitive composition according to the present disclosure~~invention~~ comprises (A) an alkali-soluble polysiloxane and/or an alkali-soluble acrylic resin, (B) a naphthoquinone diazide compound, (C) a solvent and (D) a metal chelate compound, and the (D) metal chelate compound has a structure represented by the following Formula (1) and the content of the (D) metal chelate compound is 0.1 to 5

parts by weight compared to 100 parts by weight of the (A) alkali-soluble polysiloxane and/or alkali-soluble acrylic resin (hereinafter, may be referred to as "alkali-soluble resin").

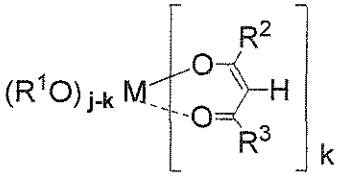
[0024]



(1)

[0025] (wherein, M is a metal atom; R^1s, the same or different, each represent hydrogen, an alkyl group, an aryl group, an alkenyl group, or a substitution product thereof; R^2 and R^3, the same or different, each represent hydrogen, an alkyl group, an aryl group, an alkenyl group, an alkoxy group, or a substitution product thereof; j represents the valency of the metal atom M; and k represents an integer of 0 to j).

In a first aspect, there is provided a positive photosensitive composition, which comprises (A) an alkali-soluble polysiloxane and/or an alkali-soluble acrylic resin, (B) a naphthoquinone diazide compound, (C) a solvent and (D) a metal chelate compound, wherein said (D) metal chelate compound has a structure represented by the following Formula (1) and the content of said (D) metal chelate compound is 0.1 to 5 parts by weight compared to 100 parts by weight of said (A) alkali-soluble polysiloxane and/or alkali-soluble acrylic resin:



(1)

(wherein, M is a metal atom; R^1s, the same or different, each represent hydrogen, an alkyl group, an aryl group, an alkenyl group, or a substitution product thereof; R^2 and R^3, the same or different, each represent hydrogen, an alkyl group, an aryl group, an alkenyl group, an alkoxy group, or a substitution product thereof; j represents the valency of said metal atom M; and k represents an integer of 0 to j).

wherein the amount of said (B) naphthoquinone diazide compound is not less than 5 parts by weight and not more than 20 parts by weight.

Further, the cured film according to the present disclosure~~invention~~ has either of the following constitutions (1) and (2). That is, the cured film according to the present disclosure~~invention~~ is:

(1) in a second aspect, a cured film which is formed from the above-described positive photosensitive composition, wherein the light transmittance per film thickness of 3 μm at a wavelength of 400 nm is not less than 85%; or

(2) in a third aspect, a cured film which is formed from the above-described positive photosensitive composition, wherein the content ratio of at least one metal selected from the group consisting of titanium, zirconium, aluminum, zinc, cobalt, molybdenum, lanthanum, barium, strontium, magnesium and calcium is 0.005 to 1 part by weight compared to 100 parts by weight of the alkali-soluble polysiloxane and/or the alkali-soluble acrylic resin composition.

[0026] The element according to the present disclosure~~invention~~ has the following constitution. That is, in a fourth aspect, an~~the~~ element according to the present disclosure~~invention~~ comprises the above-described cured film.

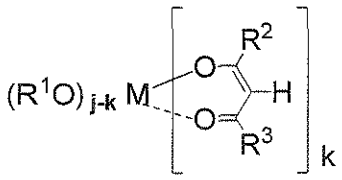
EFFECTS ~~OF THE INVENTION~~

[0027] The positive photosensitive composition as defined above ~~according to the present invention~~ has high heat resistance and high transparency, as well as excellent adhesion in development and wet-heat resistance. Further, a cured film obtained therefrom can be suitably used as a planarization film for a TFT substrate, an interlayer insulation film, a protective film or an insulation film for a touch panel, or a core or clad material of an optical waveguide.

MODE FOR CARRYING OUT THE INVENTION

[0028] The positive photosensitive composition according to the present invention comprises (A) an alkali-soluble resin, (B) a naphthoquinone diazide compound, (C) a solvent and (D) a metal chelate compound and, in the positive photosensitive composition, the (D) metal chelate compound has a structure represented by the following Formula (1) and the content of the (D) metal chelate compound is 0.1 to 5 parts by weight compared to 100 parts by weight of the (A) alkali-soluble resin.

[0029]



(1)

[0030] (wherein, M is a metal atom; R^1s, the same or different, each represent hydrogen, an alkyl group, an aryl group, an alkenyl group, or a substitution product thereof; R^2 and R^3, the same or different, each represent hydrogen, an alkyl group, an aryl group, an alkenyl group, an alkoxy group, or a substitution product thereof; j represents the valency of the metal atom M; and k represents an integer of 0 to j).

The (A) alkali-soluble resin used in the present invention is a polysiloxane and/or an acrylic resin which dissolve in an aqueous alkaline solution having a pH of not lower than 8. In order to express alkali-solubility, the resin has at least one acidic functional group such as a silanol group, a carboxylic acid group and/or a