Literature 1 has a problem in that, due to pattern reflow or curing shrinkage at high temperature processing at 150 °C or higher, a rectangular pattern cannot be formed, resulting in lower resolution.

[0008] A technique described in Patent Literature 2 has a problem in that, with this technique, a high-temperature processed film of negative polyimide is difficult to peel, and thus, a complicated process is required in which a silicon dioxide thin film or a metal thin film is formed under a polyimide layer and peeled by lift-off. Furthermore, there is a problem in that this technique results in insufficient resolution.

[0009] A technique described in Patent Literature 3 has a problem in that this technique provides high resolution, but provides an insulating protective film, which is insoluble in a resist peeling liquid, and hence, the film is not suitable as a photoresist or an ion implantation mask.

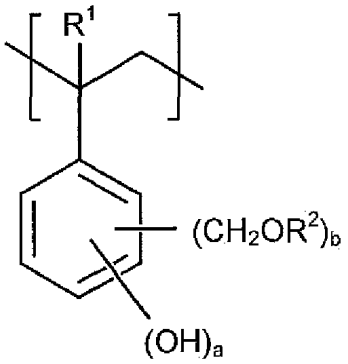
[0010] An object of the embodiments disclosed herein is to provide a resin composition that solves the above-mentioned problems associated with the prior arts, allows high resolution and a pattern form to be maintained even after high temperature processing, and is applicable as a photoresist that can be peeled off after processing.

Solution to Problem

[0011] A resin composition according to the present disclosure includes: (A1) an alkali-soluble resin having a structural unit represented by general formula (1); (A2) at least one resin selected from the group consisting of polyimides, polybenzoxazoles, polyamideimides, precursors thereof, and copolymers thereof, the resin having a substituent that reacts with a reactive group of the alkali-soluble resin; and (B) a photosensitizer. An amount

of the resin (A2) is 310 to 2,000 parts by weight with respect to 100 parts by weight of the resin (A1).

[0012]



(1)

[0013] In the formula (1), R^1 is a hydrogen atom or a C_{1-5} alkyl group; R^2 is a hydrogen atom or a C_{1-6} alkyl group; a is an integer of 0 to 4; b is an integer of 1 to 3; and a + b is an integer of 1 to 5.

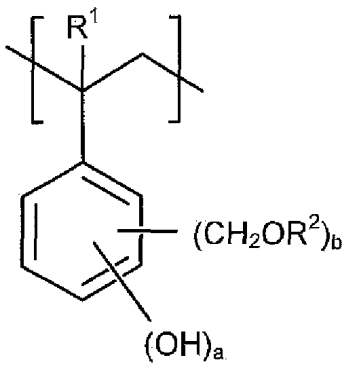
In an aspect, there is provided a resin composition, comprising:

(A1) an alkali-soluble resin having a structural unit represented by general formula (1);

(A2) at least one resin selected from the group consisting of polyimides, polybenzoxazoles, polyamideimides, precursors thereof, and copolymers thereof, the resin having a substituent that reacts with a reactive group of the alkali-soluble resin; and

(B) a photosensitizer, wherein

an amount of the resin (A2) is 310 to 2,000 parts by weight with respect to 100 parts by weight of the resin (A1),



(1)

wherein R^1 is a hydrogen atom or a C_{1-5} alkyl group; R^2 is a hydrogen atom or a C_{1-6} alkyl group; a is an integer of 0 to 4; b is an integer of 1 to 3; and a + b is an integer of 1 to 5.

In another aspect, there is provided a photoresist, comprising the resin composition as defined above.

In another aspect, there is provided a method for manufacturing a semiconductor element, the method comprising the steps of:

(1) forming a pattern of the resin composition as defined above on a substrate;

(2) performing, at 150 °C or higher, at least one step selected from the group consisting of (a) doping the substrate with impurity ions, (b) etching the substrate, and (c) dry-forming a film on the substrate; and

(3) peeling off the pattern.

In another aspect, there is provided a semiconductor device, comprising a semiconductor element obtained by the method as defined above.

Advantageous Effects

[0014] The present invention provides a resin composition that allows high resolution and a pattern form to be maintained even after high temperature processing and

is applicable as a photoresist that can be peeled off after processing.

Description of Embodiments

[0015] A resin composition according to the present invention includes: (A1) an alkali-soluble resin having a structural unit represented by the general formula (1); (A2) at least one resin selected from the group consisting of polyimides, polybenzoxazoles, polyamideimides, precursors thereof, and copolymers thereof, the resin having a substituent that reacts with a reactive group of the alkali-soluble resin; and (B) a photosensitizer, wherein an amount of the resin (A2) is 310 to 2,000 parts by weight with respect to 100 parts by weight of the resin (A1).

[0016]