We claim:

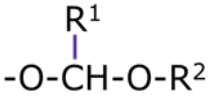
1. A chemically amplified photoresist composition comprising (A) a polymer component, (B) a photoacid generator, (C) a photoactive diazonaphthoquinone compound, and (D) a solvent, wherein

(A) the polymer component is a mixture of (A-1) a Novolak derivative and (A-2) a polymer comprising hydroxystyrene repeat units;

(A-1) a Novolak derivative comprises Novolak repeat units with free phenolic hydroxy moieties and phenolic hydroxy moieties protected with an acid cleavable acetal moiety; and

(A-2) a polymer comprising hydroxystyrene repeat units with free phenolic hydroxy moieties and phenolic hydroxy moieties protected with an acid cleavable acetal moiety.

2. The composition according to claim 1, wherein the acid cleavable acetal moiety is a group represented by formula (1):



(1)

wherein, R^1 and R^2 represent each independently a C_{1-4} alkyl.

3. The composition according to claims 1 or 2, wherein a mass ratio of the Novolak derivative to the polymer comprising hydroxystyrene repeat units is approximately 76:24 to approximately 64:36.

4. The composition according to claims 1 or 2, wherein a mass ratio of the Novolak derivative to the polymer comprising hydroxystyrene repeat units is approximately 73:27 to approximately 67:33.

5. The composition according to claims 1 or 24, wherein a mole ratio of the phenolic hydroxy moieties protected with the acid cleavable acetal moiety to the total phenolic hydroxy moieties constituted in (A) the polymer component is approximately 20 to approximately 31 mol%.

6. The composition according to claims 1 or 2, wherein a mole ratio of the phenolic hydroxy moieties protected with the acid cleavable acetal moiety to the total phenolic hydroxy

moieties constituted in (A) the polymer component is approximately 23 to approximately 28 mol%.

7. The composition according to claims 1 or 2, wherein the Novolak derivative is selected from the group consisting of a phenol-formaldehyde Novolak derivative, a cresol-formaldehyde Novolak derivative and a xylenol-formaldehyde Novolak derivative.

8. The composition according to claims 1 or 2, wherein the polymer comprising hydroxystyrene repeat units comprises a unit selected from the group consisting of a 4-hydroxystyrene unit, a 3- hydroxystyrene unit, a 2-hydroxystyrene unit and any mixture thereof.

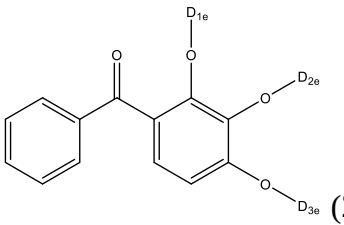
9. The composition according to claims 1 or 2, wherein the mass ratio of (A) the polymer component to the total mass of the composition is approximately 15 to approximately 22 mass %.

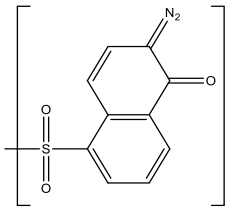
10. The composition according to claims 1 or 2, wherein (B) the photoacid generator is at least selected from the group consisting of aromatic imide N-oxysulfonate derivatives of an organic sulfonic acid, an aromatic sulfonium salt of an organic sulfonic acid and trihalotriazine derivatives.

11. The composition according to claims 1 or 2, wherein the mass ratio of the (B) the photoacid generator to the total mass of the solid components in the composition is approximately 1.1 to approximately 1.6 mass %.

12. The composition according to claims 1 or 2, wherein (C) the photoactive diazonaphthoquinone compound is derived from a 1,2-diazonaphthouqinone-5-sulfonate compound or a 1,2-diazonaphthoquinone-4-sulfonate compound or a mixture thereof.

13. The composition according to claim 1 or 2, wherein (C) the photoactive diazonaphthoquinone compound is either a single photoactive diazonaphthoquinone compound or a mixture of photoactive diazonaphthoquinone compounds having structure (2), wherein D_{1e}, D_{2e}, and D_{3e} are individually selected from H or a moiety having structure (3), and further wherein at least one of D_{1e}, D_{2e}, or D_{3e} is a moiety having structure (3),



(2)


(3)

14. The composition according to claims 1 or 2, wherein the mass ratio of the (C) the photoactive diazonaphthoquinone compound to the total mass of the solid component in the composition is approximately 12 to approximately 18 mass %.

15. The composition according to claims 1 or 2, further comprising a base compound.

16. The composition according to claim 15, wherein the base component is selected from an amine compound or a mixture of amine compounds having a boiling point above 100°C, at atmospheric pressure, and a pKa of at least 1.

17. The composition according to claims 15 or 16, wherein the mass ratio of the base component to the total mass of the solid component in the composition is approximately 0.11 to approximately 0.16 mass %.

18. The composition according to claims 1 or 2, further comprising a heterocyclic thiol compound.

19. The composition according to claim 18, wherein the heterocyclic thiol compound is present and is selected from mono or di thiol derivatives of an unsaturated heterocyclic compound comprising nitrogen, sulfur or a combination of these two atoms, as the heteroatoms in the heterocyclic compound.

20. The composition according to claims 1 or 2, wherein (A) the polymer component further comprises an acetal-group-crosslinked copolymer with of (A-1) a Novolak derivative and (A-2) a polymer comprising hydroxystyrene repeat units; wherein

(A-1) a Novolak derivative comprises Novolak repeat units with free phenolic hydroxy moieties and phenolic hydroxy moieties protected with the acid cleavable acetal moiety; and

(A-2) a polymer comprising hydroxystyrene repeat units with free phenolic hydroxy moieties and phenolic hydroxy moieties protected with the acid cleavable acetal moiety.

21. A process for imaging a resist comprising the steps;

i) coating the composition of claims 1 or 2 above a substrate to form a resist film;

ii) selectively exposing said resist film to light using a mask to form a selectively exposed resist film;

iii) developing said selectively exposed film to form a positively imaged resist film over said substrate.

22. A method for manufacturing a device, comprising a manufacturing method of imaging a resist on a substrate according to claim 21.