We claim:

1. A composition comprising a polymer component, a photoacid generator component (PAG), a photoactive diazonaphthoquinone compound (PAC) component, a base component, a solvent component, and an optional heterocyclic thiol component, wherein;

said polymer component is selected from the group consisting of Polymer Component C, Polymer Component D, Polymer Component E, and Polymer Component H,

Polymer Component C comprising repeat units having structures (I), (II), and (VI), where structure (VI) is an acetal, comprising a moiety functionalized with a PAC moiety, protecting a repeat unit comprising a Novolak phenolic hydroxy moiety;

wherein Ra, Rc and Rp are independently a C-1 to C-4 alkyl; Rb, Rd, and Rq are independently a -X-Phenol, wherein X is -O-, $-C(CH_3)_2-$, -(C=O)- or $-SO_2-$, and na, nc, and np, independently, are 0 to 3; nb, nd, and nq, independently are 0 or 1, and the sum of na and nb, the sum of nc and nd, and the sum of np and nq, respectively, do not exceed 3;

Re, Rf, and Rr are independently selected from a C-1 to C-4 alkyl, PACb is a PAC component in the repeat unit having structure (VI) attached through a linking group Xd, wherein Xd is selected from the group consisting of,

a direct valence bond,

an alkylene moiety,

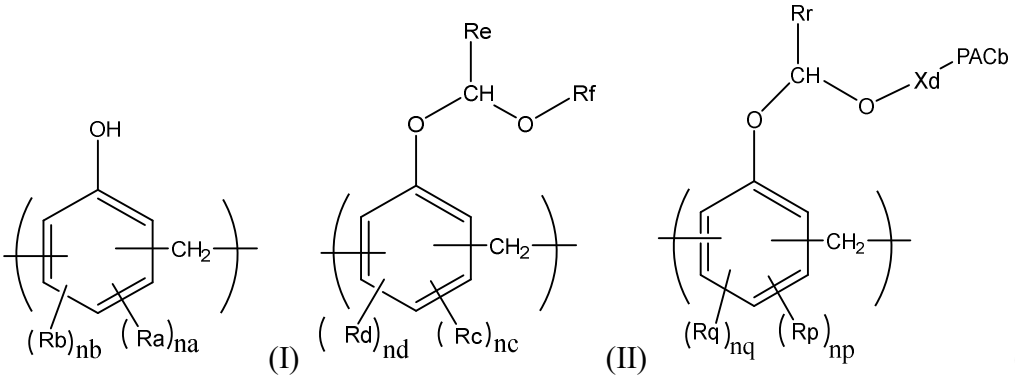
an alkyleneoxy moiety, wherein the alkylene end is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the oxy end of the alkyleneoxy moiety is attached to the PACb moiety, and

a moiety comprising an acetal selected from the group consisting of the following;

an -alkylene-O-$CH(CH_3)$-O-,

an -alkylene-O-alkylene-O-$CH(CH_3)$-O-, and

an -alkylene$(-O\text{-alkylene})_x$-O-$CH(CH_3)$-O-, wherein x is 2 to 6, and further wherein, in each of said acetal comprising moiety, the alkylene end of this moiety is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the acetal portion of said moiety comprising an acetal is attached to the PACb moiety;



Polymer Component D comprising repeat units having structures (I), (III), (IV) and (VI), where structure (VI) is an acetal, comprising a moiety functionalized with a PAC moiety, protecting a repeat unit comprising a Novolak phenolic hydroxy moiety;

wherein the repeat units having structures (III) and (IV) are attached together through the positions designated by ~~~, forming a di-functional acetal comprising moiety, forming a linking point in said polymer component between two different polymer chains in said polymer component, and further;

Ra, Rg, Rk and Rp are independently a C-1 to C-4 alkyl; Rb, Rh, Rl and Rq are independently a -X-Phenol, wherein X is -O-, -$C(CH_3)_2$-, -(C=O)- or -SO_2-, and na, ng, nk and np independently, are 0 to 3; nb, nh, nl and nq, independently are 0 or 1, and the sum of na and nb, the sum of nh and ng, the sum of nl and nk, and the sum of np and nq respectively, do not exceed 3;

Ri, Rm, and Rr are independently selected from a C-1 to C-4 alkyl,

Xa is an alkylene, an -alkyleneoxyalkylene- moiety, or an -alkylene(-O-alkylene)$_{x'}$- moiety wherein x' is 2 to 6; and further wherein;

PACb is a PAC component in the repeat unit having structure (VI) attached through a linking group Xd, wherein Xd is selected from the group consisting of;

a direct valence bond,

an alkylene moiety,

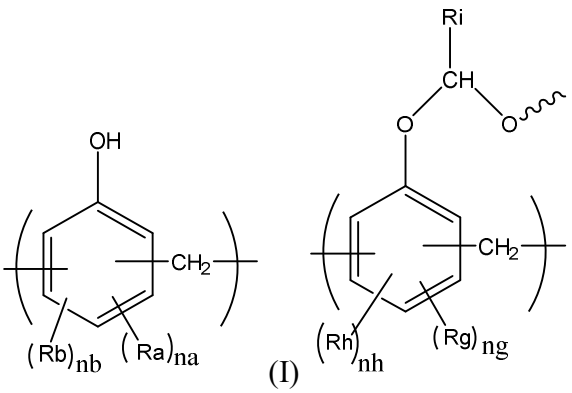
an alkyleneoxy moiety, wherein the alkylene end is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the oxy end of the alkyleneoxy moiety is attached to the PACb moiety, and

a moiety comprising an acetal selected from the group consisting of the following;

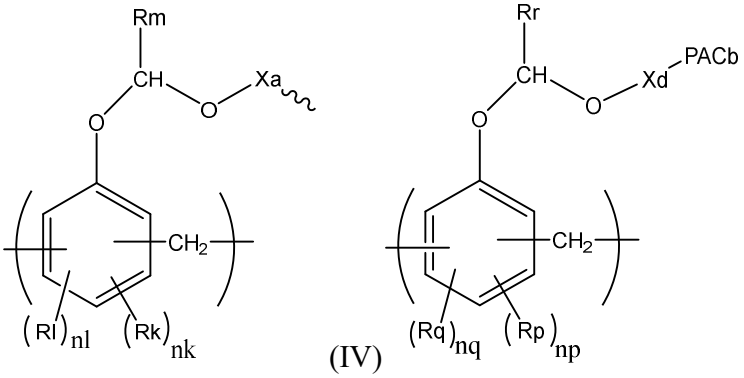
an -alkylene-O-$CH(CH_3)$-O-,

an -alkylene-O-alkylene-O-$CH(CH_3)$-O-, and

an -alkylene(-O-alkylene)$_x$-O-CH(CH_3)-O-, wherein x is 2 to 6, and further wherein, in each of said acetal comprising moiety, the alkylene end of this moiety is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the acetal portion of said moiety comprising an acetal is attached to the PACb moiety;



(I) (III)



(IV) (VI);

Polymer Component E comprising repeat units of structures (I), (III), (V) and (VI), where structure (VI) is an acetal, comprising a moiety functionalized with a PAC moiety, protecting a repeat unit comprising a Novolak phenolic hydroxy moiety;

wherein the repeat units having structures (III) and (V) are attached together through the positions designated by ~~~, forming a di-functional acetal comprising moiety, forming a linking point in said polymer component between two different polymer chains in said polymer component,

Ra, Rg, Rn and Rp are independently a C-1 to C-4 alkyl; Rb, Rh, Ro and Rq are independently a -X-Phenol, wherein X is -O-, -C(CH_3)$_2$-, -(C=O)- or -SO_2-, and na, ng, nn and np independently, are 0 to 3; nb, nh, no and nq, independently are 0 or 1, and the sum of na and nb, the sum of ng and nh, the sum of nn and no, , and the sum of np and nq respectively, do not exceed 3;

Ri, Rr and Rm2 independently are selected from a C-1 to C-4 alkyl

Xb is -O-, -$C(CH_3)_2$-, -(C=O)- or -SO_2-;

Xc is an alkylene, an -alkyleneoxyalkylene- moiety, or an -alkylene(-O-alkylene)$_{x'}$- moiety wherein x' is 2 to 6; and further wherein repeat unit of structures (III) and (V) are attached together through the positions designated by ∿∿∿, forming a di-functional acetal comprising moiety, forming a linking point in said polymer component between two different polymer chains in said polymer component;

PACb is a PAC component in the repeat unit having structure (VI) attached through a linking group Xd, wherein Xd is selected from the group consisting of the following;

a direct valence bond,

an alkylene moiety,

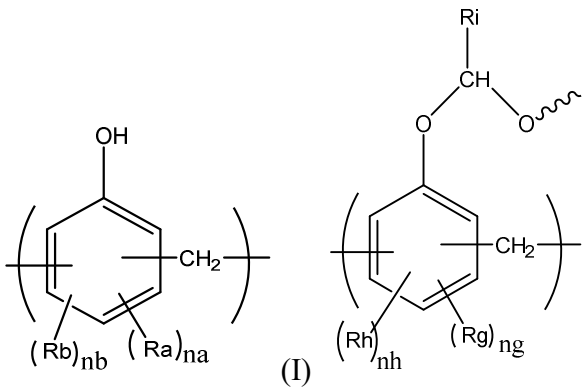
an alkyleneoxy moiety, wherein the alkylene end is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the oxy end of the alkyleneoxy moiety is attached to the PACb moiety, and

a moiety comprising an acetal selected from the group consisting of the following;

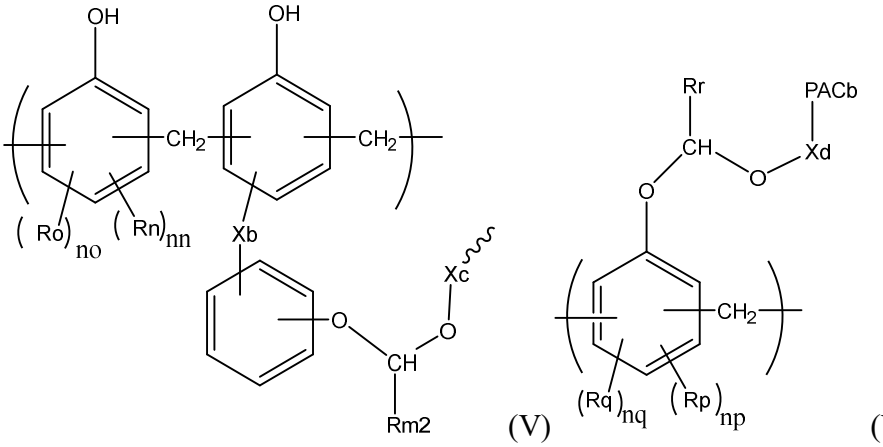
an -alkylene-O-$CH(CH_3)$-O-,

an -alkylene-O-alkylene-O-$CH(CH_3)$-O-, and

an -alkylene(-O-alkylene)$_x$-O-$CH(CH_3)$-O-, wherein x is 2 to 6, and further wherein, in each of said acetal comprising moiety, the alkylene end of this moiety is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the acetal portion of said moiety comprising an acetal is attached to the PACb moiety;



(I) (III)



(V) (VI);

Polymer Component H comprising the repeat unit of structure (I), Structure (II), Structure (III), Structure (IV) and structure (VI) where structure (VI) is an acetal, comprising a moiety functionalized with a PAC moiety, protecting a repeat unit comprising a Novolak phenolic hydroxy moiety;

wherein the repeat units having structures (III) and (IV) are attached together through the positions designated by ~~~, forming a di-functional acetal comprising moiety, forming a linking point in said polymer component between two different polymer chains in said polymer component, and further;

Re and Rf are independently selected from a C-1 to C-4 alkyl

Ra, Rc, Rg, Rk and Rp are independently a C-1 to C-4 alkyl; Rb, Rd, Rh, Rl and Rq are independently a -X-Phenol, wherein X is -O-, $-C(CH_3)_2-$, -(C=O)- or $-SO_2-$, and na, nc, ng, nk and np independently, are 0 to 3; nb, nd, nh, nl and nq, independently are 0 or 1, and the sum of na and nb, the sum of nh and ng, the sum of nl and nk, and the sum of np and nq respectively, do not exceed 3;

Ri, Rm, and Rr are independently selected from a C-1 to C-4 alkyl,

Xa is an alkylene, an -alkyleneoxyalkylene- moiety, or an $-alkylene(-O-alkylene)_{x'}-$ moiety wherein x' is 2 to 6; and further wherein;

PACb is a PAC component in the repeat unit having structure (VI) attached through a linking group Xd, wherein Xd is selected from the group consisting of;

a direct valence bond,

an alkylene moiety,

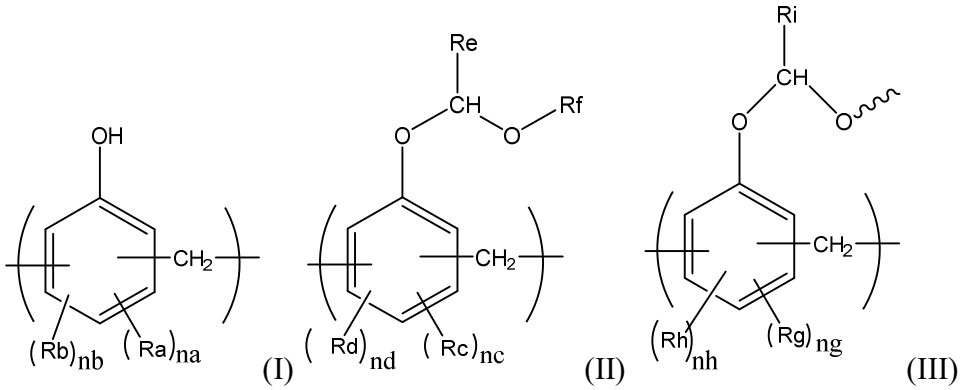
an alkyleneoxy moiety, wherein the alkylene end is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the oxy end of the alkyleneoxy moiety is attached to the PACb moiety, and

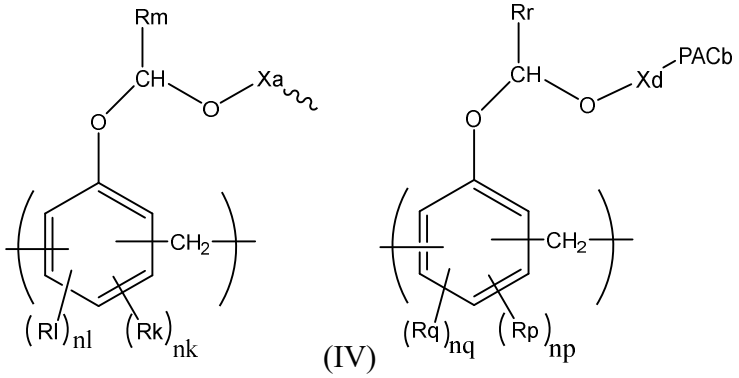
a moiety comprising an acetal selected from the group consisting of the following;

an -alkylene-O-CH(CH_3)-O-,

an -alkylene-O-alkylene-O-CH(CH_3)-O-, and

an -alkylene(-O-alkylene)$_x$-O-CH(CH_3)-O-, wherein x is 2 to 6, and further wherein, in each of said acetal comprising moiety, the alkylene end of this moiety is attached to the acetal oxygen moiety of the repeat unit of structure (VI), and the acetal portion of said moiety comprising an acetal is attached to the PACb moiety;





and further wherein, said photoactive diazonaphthoquinone compound (PAC) component, is either said acetal comprising moiety functionalized with a PAC moiety protecting a repeat unit comprising a Novolak phenolic hydroxy moiety of structure (VI) present in said polymer component Polymer Component C Polymer Component D Polymer Component E Polymer Component H as sole PAC component, or is in combination with a free PAC component.

2. The composition of claim 1, wherein said polymer component is Polymer Component C.

3. The composition of claim 1, wherein said polymer component is Polymer Component D.

4. The composition of claim 1, wherein in Polymer Component E; the repeat unit having structure (I) is present from 60 mole % to 98 mole %; the repeat unit having structure (II) is present

up to 40 mole %; and further wherein, the repeat unit having structure (II) and repeat unit having structure (VI) do not exceed 45 mole % of the repeat units in said polymer component.

5. The composition of claim 1, wherein in Polymer Component D the repeat unit having structure (I) is present fropm 60 mole % to 98 mole %, and further wherein, the linking point between two polymer chains of the polymer components, formed by the repeat units of structure (III) and structure (IV) is present up to 25 mole % of the polymer component's repeat units and further wherein the repeat unit having structure (VI) is present up to 20 mole %.

6. The composition of claim 1, wherein in Polymer Component E the repeat unit having structure (I) is present from 60 mole % to 98 mole %, and further wherein, the linking point between two polymer chains of the polymer components, formed by the repeat units of structure (III) and structure (V) is present up to 25 mole % of the polymer component's repeat units and further wherein the repeat unit having structure (VI) is present up to 20 mole %.

7. The composition of claim 1 wherein in Polymer Component C repeat unit of structure (VI) is present up to 20 mole % of the repeat units in said polymer.

8. The composition of claim 1, wherein said polymer component is Polymer Component E.

9. The composition according to claim 1, wherein said heterocyclic thiol component 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.

10. The composition according to claim 1, wherein said 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 pK_a of at least 1.

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

i) coating the composition of claim 1 on a substrate to form a resist film;

ii) selectively exposing said resist film to UV 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.

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

ia) coating the composition of claim 1 on a substrate to form a resist film;

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

iiia) baking said selectively exposed resist film to form a baked selectively exposed resist film;

iva) developing said selectively exposed and baked resist film to form a positively imaged resist film over said substrate.

13. The composition of claim 1 wherein in Polymer Component D the repeat unit of structure (VI) is present up to 20 mole % of the repeat units in said polymer.

14. The composition of claim 1 wherein in Polymer Component E the repeat unit of structure (VI) is present up to 20 mole % of the repeat units in said polymer.

15. The composition of claim 1, wherein said polymer component is Polymer Component H.

16. The composition of claim 1, wherein in Polymer Component H where the repeat unit of structure (II), is present up to 40 mole %.

17. The composition of claim 16, wherein the repeat unit having structure (I) is present from 60 mole % to 98 mole %, and further wherein, the linking point between two polymer chains of the polymer components, formed by the repeat units of structure (III) and structure (IV) is present up to 25 mole % of the polymer component's repeat units and further wherein the repeat unit having structure (VI) is present up to 20 mole %.