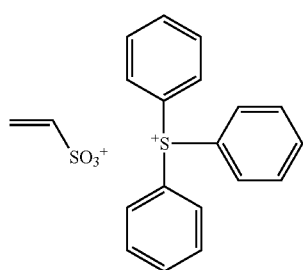
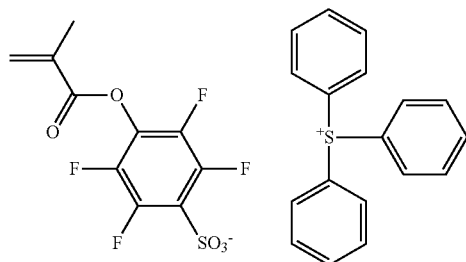
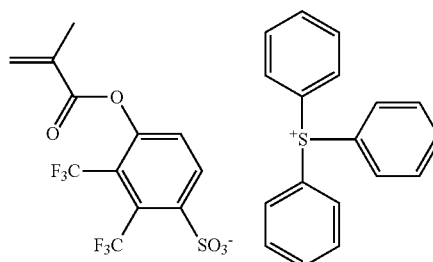
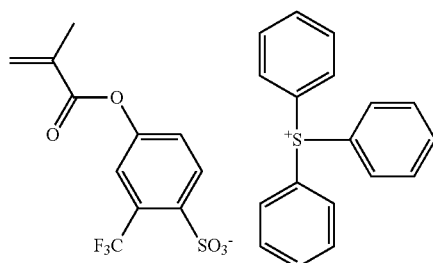
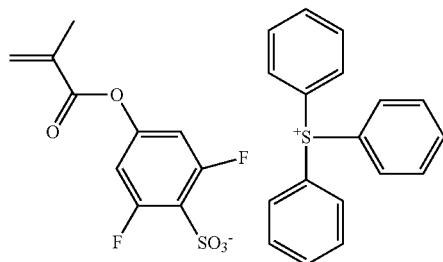
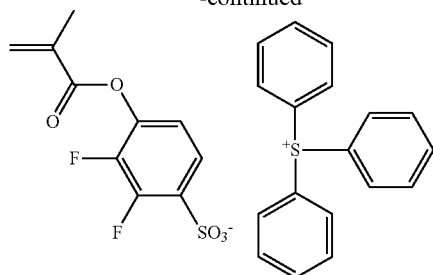


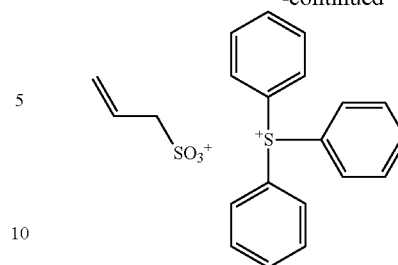
95

-continued



96

-continued



The attachment of an acid generator to the polymer main chain is effective in restraining acid diffusion, thereby preventing a reduction of resolution due to blur by acid diffusion. Also roughness (LWR) is improved since the acid generator is uniformly distributed. Where a base polymer containing recurring units of at least one type selected from recurring units (f1) to (f3) is used, the addition of a separate PAG may be omitted.

The base polymer for formulating the positive resist composition comprises recurring units (a1) or (a2) having an acid labile group as essential component and additional recurring units (b), (c), (d), (e), (f1), (f2) and (f3) as optional components. A fraction of units (a1), (a2), (b), (c), (d), (e), (f1), (f2) and (f3) is: preferably $0 \leq a1 < 1.0$, $0 \leq a2 < 1.0$, $0 < a1 + a2 < 1.0$, $0 \leq b \leq 0.9$, $0 \leq c \leq 0.9$, $0 \leq d \leq 0.8$, $0 \leq e \leq 0.8$, $0 \leq f1 \leq 0.5$, $0 \leq f2 \leq 0.5$, and $0 \leq f3 \leq 0.5$; more preferably $0 \leq a1 \leq 0.9$, $0 \leq a2 \leq 0.9$, $0.1 \leq a1 + a2 \leq 0.9$, $0 \leq b \leq 0.8$, $0 \leq c \leq 0.8$, $0 \leq d \leq 0.7$, $0 \leq e \leq 0.7$, $0 \leq f1 \leq 0.4$, $0 \leq f2 \leq 0.4$, and $0 \leq f3 \leq 0.4$; and even more preferably $0 \leq a1 \leq 0.8$, $0 \leq a2 \leq 0.8$, $0.1 \leq a1 + a2 \leq 0.8$, $0 \leq b \leq 0.75$, $0 \leq c \leq 0.75$, $0 \leq d \leq 0.6$, $0 \leq e \leq 0.6$, $0 \leq f1 \leq 0.3$, $0 \leq f2 \leq 0.3$, and $0 \leq f3 \leq 0.3$. Note $a1 + a2 + b + c + d + e + f1 + f2 + f3 = 1.0$.

For the base polymer for formulating the negative resist composition, an acid labile group is not necessarily essential. The base polymer comprises recurring units (b), and optionally recurring units (c), (d), (e), (f1), (f2) and/or (f3). A fraction of these units is: $0 < b \leq 1.0$, $0 \leq c \leq 0.9$, $0 \leq d \leq 0.8$, $0 \leq e \leq 0.8$, $0 \leq f1 \leq 0.5$, $0 \leq f2 \leq 0.5$, and $0 \leq f3 \leq 0.5$; preferably $0.2 \leq b \leq 1.0$, $0 \leq c \leq 0.8$, $0 \leq d \leq 0.7$, $0 \leq e \leq 0.7$, $0 \leq f1 \leq 0.4$, $0 \leq f2 \leq 0.4$, and $0 \leq f3 \leq 0.4$; and more preferably $0.3 \leq b \leq 1.0$, $0 \leq c \leq 0.75$, $0 \leq d \leq 0.6$, $0 \leq e \leq 0.6$, $0 \leq f1 \leq 0.3$, $0 \leq f2 \leq 0.3$, and $0 \leq f3 \leq 0.3$. Note $b + c + d + e + f1 + f2 + f3 = 1.0$.

The base polymer may be synthesized by any desired methods, for example, by dissolving one or more monomers selected from the monomers corresponding to the foregoing recurring units in an organic solvent, adding a radical polymerization initiator thereto, and effecting heat polymerization. Examples of the organic solvent which can be used for polymerization include toluene, benzene, tetrahydrofuran, diethyl ether and dioxane. Examples of the polymerization initiator used herein include 2,2'-azobisisobutyronitrile (AIBN), 2,2'-azobis(2,4-dimethylvaleronitrile), dimethyl 2,2'-azobis(2-methylpropionate), benzoyl peroxide, and lauroyl peroxide. Preferably the system is heated at 50 to 80° C. for polymerization to take place. The reaction time is 2 to 100 hours, preferably 5 to 20 hours.

When hydroxystyrene or hydroxyvinyl naphthalene is copolymerized, an alternative method is possible. Specifically, acetoxystyrene or acetoxylvinylnaphthalene is used instead of hydroxystyrene or hydroxyvinyl naphthalene, and after polymerization, the acetoxy group is deprotected by alkaline hydrolysis as mentioned above, for thereby converting the polymer product to hydroxystyrene or hydroxyvinyl naphthalene. For alkaline hydrolysis, a base such as aqueous ammonia or triethylamine may be used. The