Patent Document 5: JP 2001-228610 A

Patent Document 6: JP 2007-316506 A

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0010]

The present inventors have first focused on the adhesion during development, which serves as an index representing unlikelihood of peeling of micropattems during development. The inventors have suspected that, in a film having a high optical density of the resin black matrix, the methods disclosed in Patent Documents 1 to 3 might be insufficient to initiate curing reaction at the substrate interface, possibly influencing the adhesion during development. In addition, since the adhesion during development is easily influenced by the underlying substrate, and the film has a poor adhesion to a soda-lime glass commonly used in touch panel applications, in particular, they have considered that it might be difficult to obtain a high-definition patterning substrate.

[0011]

Further, in the black resin composition having a high optical density of the resin black matrix and containing a large number of pigment particles, its compatibility with a developer has been insufficient and peeling of micropattems has occurred during development. Therefore, the inventors have also focused on the compatibility.

[0012]

~~In view of the above-described drawbacks of the prior art, an object~~Embodiments of the present invention ~~is to~~ provide a black resin composition which, when a resin black matrix is formed on a glass substrate, has a good adhesion to the substrate during its development and a good compatibility with a developer, and is capable of high-definition patterning; as well as to provide a resin black matrix substrate using such a photosensitive black resin composition, and a light-shielding film for a color filter and a touch panel.

MEANS FOR SOLVING THE PROBLEMS

[0013]

Patent Documents 4 and 5 describe an oxetane compound, and disclose that a cured film after post-bake has an excellent physical adhesion to a substrate, an

excellent resolution and an excellent sensitivity. However, there is no disclosure regarding the adhesion to the substrate during development, and the application thereof to the black resin composition having a high optical density of the resin black matrix and containing a large number of pigment particles.

[0014]

On the other hand, Patent Document 6 discloses that, in the photosensitive resin composition containing pigments, a cured film after post-bake composed of a resin of copolymer having an oxetanyl group as a structural unit is effective in improving physical adhesion to a substrate. However, the disclosure is directed to the use of a copolymer, and no observation has been made regarding the adhesion to the substrate during development, and regarding the compatibility with a developer, which is often an issue in the black resin composition containing a large number of pigment particles.

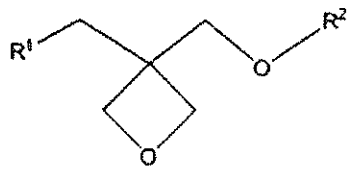
[0015]

Here, the present inventors have found that an addition of a specific oxetane compound in appropriate amount serves to solve the problems described above.

[0016]

~~The object~~Embodiments of the present invention ~~is~~are achieved by the following constitution.

~~(1) A~~ According to a first aspect, there is provided a photosensitive black resin composition comprising at least a light-shielding material, an alkali-soluble resin, a photopolymerization initiator and a solvent, wherein the photosensitive black resin composition comprises at least an oxetane compound having a structure represented by General Formula (A) below as an additive, and wherein the amount of the oxetane compound contained in the composition is 1.5 to 10.0% by weight relative to the total amount of the light-shielding material and the alkali-soluble resin.:



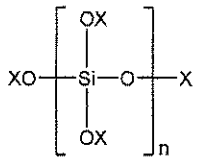
(A)

(wherein R^1 and R^2 may be the same or different; R^1 represents a hydrogen atom or an alkyl group having 1 to 10 carbon atoms, wherein the alkyl group may further comprise a substituent; and R^2 represents a hydrogen atom, a silyl group or an alkyl group having 1 to 10

carbon atoms, wherein the silyl group and the alkyl group may further comprise a substituent).

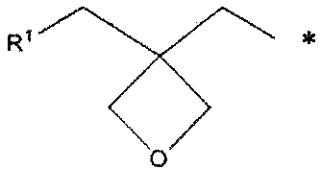
~~(2) The photosensitive black resin composition as described in (1),~~ In an embodiment, ~~wherein~~ the oxetane compound comprises a silyl group.

~~(3) The photosensitive black resin composition as described in (1) or (2), wherein~~ In an embodiment, the oxetane compound is represented by Structural Formula (B) below~~:~~



(B)

(wherein X represents the oxetane compound below and n represents a natural number of 10 or less)



(X)

(wherein * represents a linking site; and R^1 represents a hydrogen atom or an alkyl group having 1 to 10 carbon atoms, wherein the alkyl group may further comprise a substituent).

~~(4) A~~According to a second aspect, there is provided a resin black matrix substrate obtained by applying the above photosensitive black resin composition ~~as described in any one of (1) to (3)~~ on a transparent substrate and then by forming a pattern.

EFFECT OF THE INVENTION

[0017]

The black resin composition as per embodiments of the present invention ~~serves to~~ provide a resin black matrix substrate having an excellent adhesion during development and

patterning accuracy.

MODE FOR CARRYING OUT THE INVENTION

[0018]

It is necessary that the photosensitive black resin composition of the present invention contains at least a light-shielding material, an alkali-soluble resin, a photopolymerization initiator and a solvent. The desirable properties thereof are described below.

[0019]

The photosensitive black resin composition of the present invention can be used to produce printing inks, ink jet inks, materials for photomask production, materials for proof printing production, etching resists, solder resists, bulkheads of plasma display panel (PDP), dielectric patterns, electrode (conductor circuit) patterns, circuit patterns of electronic components, conductive pastes, conductive films, light-shielding images such as black matrix (hereinafter referred to as "BM") or the like. Preferably, the black resin composition can be suitably used to set a light-shielding image (including BM), e.g., in a gap of a coloring pattern, vicinity portions, and in the side of the outside light of TFT to improve the display property of color filters for color liquid crystal display devices and the like, and can be suitably used for light-shielding films for touch panels.

[0020]

Especially preferably, the black resin composition is used in liquid crystal display devices, plasma display devices, EL display devices equipped with inorganic EL, CRT display devices, and display devices comprising a touch panel, as a BM such as black edges formed on the peripheral portion, grid-like or stripe-like black portions between color pixels of red, blue, and green, and, more preferably, as a BM such as dotted and linear black patterns for TFT light shielding.

[0021]

Examples of the light-shielding material used in the present invention include black pigments such as carbon black, titanium black, chromium oxide, iron oxide, aniline black, perylene pigments and C.I. Solvent Black 123; inorganic black