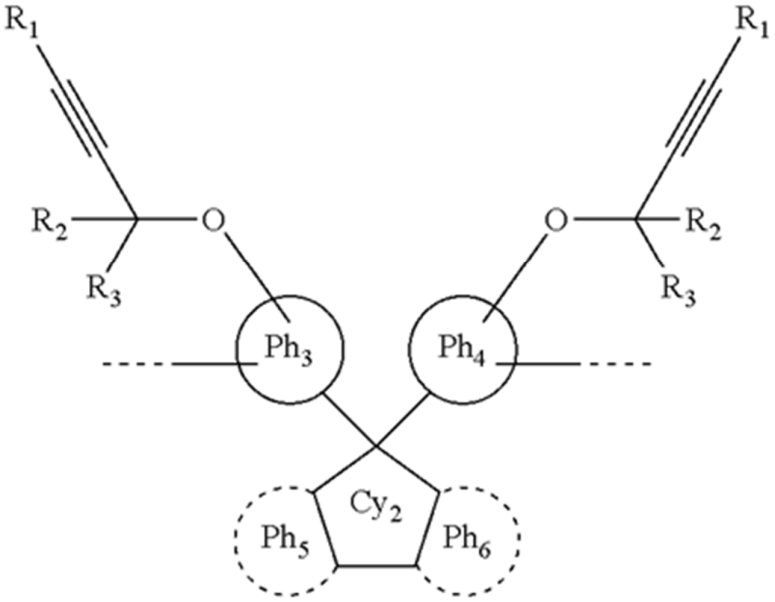
Claims

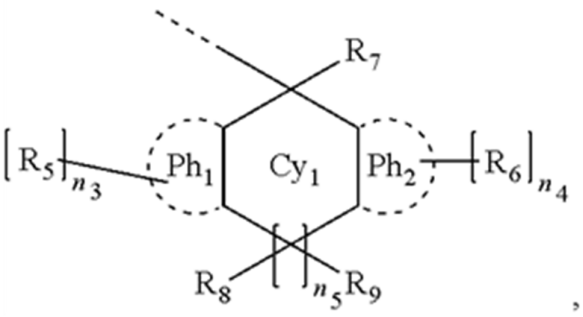
1. A polymer comprising unit A and unit B, wherein unit A is represented by Formula (1)',

formula (1)'



Cyclic Cy_2 is cyclopentane,
Ph_3 and Ph_4 are each independently C_{6-10} aromatic hydrocarbon rings,
Ph_5 and Ph_6 are each independently C_{6-10} aromatic hydrocarbon rings, which individually compose adjacent 2 carbons in cyclic Cy_2,
R_1 is hydrogen, halogen, cyano, unsubstituted C_{1-6} alkyl, C_{1-6} alkyl substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano, unsubstituted C_{3-20} aromatic ring, or C_{3-20} aromatic ring substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano,
R_2 and R_3 are each independently hydrogen, halogen, cyano, unsubstituted C_{1-6} alkyl, C_{1-6} alkyl substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano, unsubstituted C_{3-20} aromatic ring, or C_{3-20} aromatic ring substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano,
unit B is represented by Formula (2),

Formula (2)



,

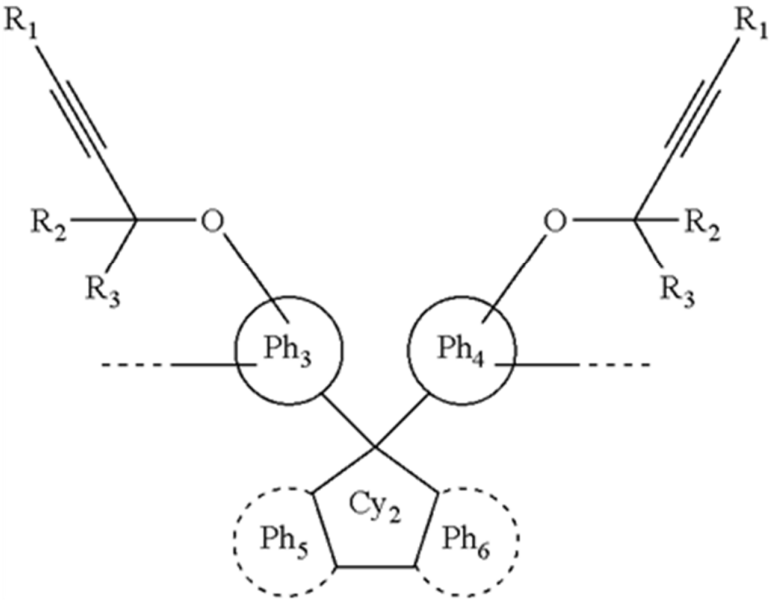
Cyclic Cy_1 is a C_{5-6} alicyclic compound,
Ph_1 and Ph_2 are each independently C_{6-10} aromatic hydrocarbon rings, which individually compose adjacent 2 carbons in cyclic Cy_1,
R_5 and R_6 are each independently hydrogen, halogen, cyano, unsubstituted C_{1-6} alkyl, or C_{1-6} alkyl substituted with at least one substituent selected from halogen and cyano, the broken straight line is a direct bond bonding to the other portion of the polymer,
R_7, R_8 and R_9 are each independently hydrogen, unsubstituted C_{1-6} alkyl, C_{1-6} alkyl substituted with at least one substituent selected from halogen or cyano, unsubstituted C_{6-16} aromatic hydrocarbon, C_{6-16} aromatic hydrocarbon substituted with at least one substituent selected from halogen or cyano, unsubstituted C_{1-6} alkylene linking to the other portion of the ethynyl derived composite, C_{1-6} alkylene substituted with at least one substituent selected from halogen or cyano linking to the other portion of the polymer, or a direct bond bonding to the other portion of the polymer,
n_3 and n_4 are each independently 0, 1, 2, 3 or 4, and
n_5 is 0 or 1 and
where the mol ratio of unit A and unit B in the polymer is 60:40-40:60.

2. The polymer according to claim 1, wherein Ph_1 and Ph_2 are each independently phenyl or naphthyl, and n_3 and n_4 are 0.

3. The polymer according to claim 1, wherein Ar is phenyl, naphthyl, fluorene, phenanthrene, perylene, or 9,9-diphenylfluorene,
R_1, R_2 and R_3 is hydrogen,
n_1 is 1 or 2, and
n_2 is 0.

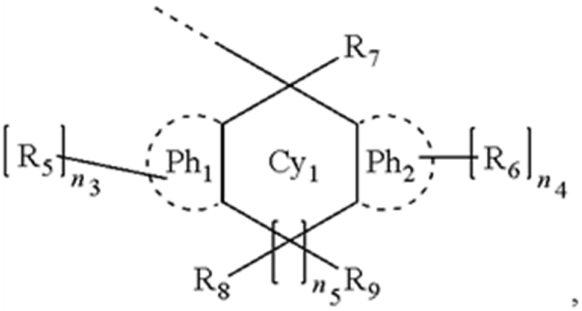
4. A composition comprising a polymer comprising unit A and unit B, wherein unit A is represented by Formula (1)',

formula (1)'



Cyclic Cy_2 is cyclopentane,
Ph_3 and Ph_4 are each independently C_{6-10} aromatic hydrocarbon rings,
Ph_5 and Ph_6 are each independently C_{6-10} aromatic hydrocarbon rings, which individually compose adjacent 2 carbons in cyclic Cy_2,
R_1 is hydrogen, halogen, cyano, unsubstituted C_{1-6} alkyl, C_{1-6} alkyl substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano, unsubstituted C_{3-20} aromatic ring, or C_{3-20} aromatic ring substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano,
R_2 and R_3 are each independently hydrogen, halogen, cyano, unsubstituted C_{1-6} alkyl, C_{1-6} alkyl substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano, unsubstituted C_{3-20} aromatic ring, or C_{3-20} aromatic ring substituted with at least one substituent selected from the group consisting of C_{1-6} alkyl, halogen and cyano,
unit B is represented by Formula (2),

Formula (2)



,

Cyclic Cy_1 is a C_{5-6} alicyclic compound,
Ph_1 and Ph_2 are each independently C_{6-10} aromatic-hydrocarbon rings, which individually compose adjacent 2 carbons in cyclic Cy_1,
R_5 and R_6 are each independently hydrogen, halogen, cyano, unsubstituted C_{1-6} alkyl, or C_{1-6} alkyl substituted with at least one substituent selected from halogen and cyano, the broken straight line is a direct bond bonding to the other portion of the polymer,
R_7, R_8 and R_9 are each independently hydrogen, unsubstituted C_{1-6} alkyl, C_{1-6} alkyl substituted with at least one substituent selected from halogen or cyano, unsubstituted C_{6-16} aromatic hydrocarbon, C_{6-16} aromatic hydrocarbon substituted with at least one substituent selected from halogen or cyano, unsubstituted C_{1-6} alkylene linking to the other portion of the ethynyl derived composite, C_{1-6} alkylene substituted with at least one substituent selected from halogen or cyano linking to the other portion of the polymer, or a direct bond bonding to the other portion of the polymer,
n_3 and n_4 are each independently 0, 1, 2, 3 or 4, and
n_5 is 0 or 1 and
where the mol ratio of unit A and unit B in the polymer is 60:40-40:60, and a solvent.

5. The composition according to claim 4, wherein the solvent comprises at least one solvent selected from the group consisting of water, hydrocarbon solvent, ether solvent, ester solvent, alcohol solvent, and ketone solvent.

6. The composition according to claim 4, wherein the amount of the polymer is 2-60 mass percent relative to the total amount of the composition and the amount of the organic solvents is 60-98 mass percent relative to the total amount of the composition.

7. The composition according to claim 4, wherein a single or a plurality of solid components in the composition satisfy below Formula (3),

1.5 less than or equal to {total number of atoms/(number of C-number of O)} less than or equal to 3.5 formula (3)
the number of C is the number of carbon atoms, and
the number of O is the number of oxygen atoms.

8. The composition according to claim 4, further comprising at least one additive selected from the group consisting of a surfactant, a crosslinking agent, an acid generator, a radical generator, a high-carbon material, a photopolymerization initiator, and an agent for enhancing adhesion to substrates.

9. The composition according to claim 4, further comprising at least one selected from the group consisting of a crosslinking agent in a concentration of 0-300,000 ppm, a photopolymerization initiator in a concentration of 0-100,000 ppm, an acid generator in a concentration of 0-50,000 ppm, a radical generator in a concentration of 0-50,000 ppm and surfactant in the amount 0-5 mass percent relative to the total amount of the composition.

10. A resist underlayer forming composition consisting of the composition according to claim 4.

11. A method for manufacturing a coating, comprising:
applying a layer of the composition according to claim 4 above a substrate; and
curing the layer to form the coating.

12. The method for manufacturing a coating according to claim 11, wherein the conditions for curing the composition comprise irradiation with ultraviolet radiations having a wavelength of 10-380 nm.

13. The method for manufacturing a coating according to claim 11, wherein the conditions for curing the composition comprise heating at 200-600 Celsius degree for 30-180 seconds.

14. A method for manufacturing a device, comprising:
forming a coating by the method according to claim 11,
forming a layer of a photoresist composition above the coating;
curing the photoresist composition to form a photoresist layer;
exposing the substrate coated with the photoresist layer;
developing the exposed substrate to form a resist pattern;
etching with the resist pattern as a mask; and
processing the substrate.

15. The method for manufacturing a device according to claim 14, further comprising forming wiring in the processed substrate.

16. The composition according to claim 4, wherein the unit A concentration compared to the whole units in one polymer is 30-70 mol percent, and the unit B concentration compared to the whole units in one polymer is 30-70 mol percent.

17. The composition according to claim 4, wherein Ph_3, Ph_4, Ph_5 and Ph_6 are each independently phenyl or naphthyl.

18. The composition according to claim 4, wherein Ph_3, Ph_4, Ph_5 and Ph_6 are each independently phenyl.

19. The composition according to claim 4, wherein the polymer has a main chain and in the main chain of the polymer, none or few of secondary carbon atom and tertiary carbon atom is contained, and
when synthesizing the polymer, the amount of the aldehyde derivative is 0-30 mol percent based on all the components to be used for the synthesis, or,
Mw of the polymer is 959˜1,250 Da.

20. The composition according to claim 4, wherein the solvents are selected from the group consisting essentially of cyclohexanone, cyclopentanone, propylene glycol monomethyl ether, propylene glycol monoethyl ether, propylene glycol monopropyl ether, propylene glycol monobutyl ether, propylene glycol dimethyl ether, propylene glycol diethyl ether, propylene glycol 1-monomethyl ether 2-acetate, propylene glycol monoethyl ether acetate, propylene glycol monopropyl ether acetate, gamma-butyrolactone, ethyl lactate, and any mixture of any of these.