Patent Claims

1. A method of manufacturing a high-defined pattern comprising the following steps of:
(1) a step of coating a resist composition comprising a novolak resin having an alkali dissolution rate of 100 - 3,000 Å on a substrate to form a resist composition layer;
(2) a step of subjecting said resist composition layer to exposure;
(3) a step of developing said resist composition layer to form a resist pattern;
(4) a step of heating said resist pattern;
(5) a step of subjecting said resist pattern to flood exposure;
(6) a step of coating a fine pattern forming composition on the surface of said resist pattern to form a fine pattern forming composition layer;
(7) a step of heating said resist pattern and said fine pattern forming composition layer to cure the regions of said fine pattern forming composition layer in the vicinity of said resist pattern and to form an insolubilized layer;
(8) a step of removing uncured regions of said fine pattern forming composition layer to form a fine pattern; and
(9) a step of heating said fine pattern;
wherein the high defined pattern has (L2/L1) being 1.05-18; where L1 is the pattern width at a 10 percent portion (D1) of the depth of the high defined pattern's cross section shape, and L2 is the pattern width at a 90 percent portion (D2) of the depth of the high defined pattern's cross section shape.

2. The method according to claim 1, wherein the exposure in the step (2) is performed using an exposure apparatus having a resolution limit of 1.5 - 5.0 μm.

3. The method according to claim 1 or 2, wherein the exposure in the step (2) is performed using a projector lens

having a numerical aperture of 0.08 - 0.15.

4. The method according to any one of claims 1 to 3, wherein the exposure amount in the step (2) is 15 - 80 mJ/cm^2.

5. The method according to any one of claims 1 to 4, wherein the light irradiated in the step (2) comprises wavelength of 300 - 450 nm.

6. The method according to any one of claims 1 to 5, wherein the mass average molecular weight of said novolak resin is 1,500 - 25,000.

7. The method according to any one of claims 1 to 6, wherein said fine pattern forming composition comprises a cross-linking agent, a polymer, and a solvent.

8. The method according to any one of claims 1 to 7, wherein the viscosity of said fine pattern forming composition measured by a capillary viscometer at 25°C is 1 - 120 cP.

9. The method according to any one of claims 1 to 8, wherein the shrink amount of said fine pattern is 0.05 - 1.00 μm.

10. The method according to any one of claims 1 to 9, wherein the shrink amount of said high-defined pattern is 0.20 - 1.50 μm.

11. The method according to any one of claims 1 to 10, wherein the temperature of the heating in the step (7) is 50 - 140°C.

12. The method according to any one of claims 1 to 11, wherein the temperature of the heating in the step (9) is 100 - 145°C.

13. The method according to any one of claims 1 to 12, wherein the uncured regions are removed by contacting said fine pattern forming composition layer and water, a liquid mixture of water and a water-soluble organic solvent, or an alkali aqueous solution in the step (8).

14. The method according to any one of claims 1 to 13, wherein the cross section shape of said resist pattern is a taper shape.

15. The method according to any one of claims 1 to 14, wherein the cross section shape of said high-defined pattern is a taper shape.

16. A method of manufacturing a display device comprising the method according to any one of claims 1 to 15.