response to this, an occurrence of particles likely to affect, especially, the performance of a fine pattern is required to be further suppressed.

[0006]

The present invention has been made in consideration of the problems described above, and an object thereof is to provide an organic processing liquid for patterning a chemical amplification resist film, which is capable of reducing occurrence of particles, a container for the organic processing liquid for patterning the chemical amplification resist film, and a pattern forming method, a method of manufacturing an electronic device, and the electronic device using the same, in a negative pattern forming method for forming a fine pattern (for example, 30 nm node or less) particularly using an organic developer.

[0007]

The present inventors minutely investigated a container for an organic developer in consideration of the problems described above, and found that the organic developer contained in a general-purpose container represented by a polyolefin-based high purity resinous container is a main cause of occurrence of the particles. Then, the inventors found that concentrations of certain types of impurities are reduced in an organic developer contained in a particular container, and further the use of the organic developer may reduce the occurrence of particles which may be problematic in a fine pattern (for example, 30 nm node or less), and completed the present invention based on these findings.

[0008]

In one aspect, there is provided a pattern forming method comprising: (A) forming a film from a chemical amplification resist composition by applying the chemical amplification resist composition on a substrate; (B) pattern exposing the film; and (C) developing the exposed film using an organic developer, wherein the organic developer is butyl acetate containing 1 ppm or less of alkylolefin having a carbon number of 22 or less, and 5 ppm or less of metal element concentration of each of Na, K, Ca, Fe, Cu, Mg, Mn, Li, Al, Cr, Ni and Zn; the organic developer is stored in a container before developing, the container having an inner wall contacting with the organic developer, the inner wall being made from a perfluoro resin; and the organic developer is filtered through a polytetrafluoroethylene filter before the developing step (C).

In another aspect, there is provided a method of manufacturing an electronic device, the method comprising the pattern forming method as described herein.

In yet another aspect, there is provided an electronic device manufactured by the method as described herein.

That is, the present invention has the following configuration, and thus the above

described object of the present invention is achieved.

[0009]

[1] An organic processing liquid for patterning a chemical amplification resist film, in which the organic processing liquid contains 1 ppm or less of alkylolefin having a carbon number of 22 or less, and 5 ppm or less of a metal element concentration of each of Na, K, Ca, Fe, Cu, Mg, Mn, Li, Al, Cr, Ni, and, Zn.

[2] The organic processing liquid described in [1], in which the organic processing liquid is an organic developer.

[3] The organic processing liquid described in [2], in which the organic developer is butyl acetate.

[4] The organic processing liquid described in [1], in which the organic processing liquid is an organic rinsing liquid.

[5] The organic processing liquid described in [4], in which the organic rinsing

CLAIMS

1. A pattern forming method comprising:

(A) forming a film from a chemical amplification resist composition by applying the chemical amplification resist composition on a substrate;

(B) pattern exposing the film; and

(C) developing the exposed film using an organic developer,

wherein the organic developer is butyl acetate containing 1 ppm or less of alkylolefin having a carbon number of 22 or less, and 5 ppm or less of metal element concentration of each of Na, K, Ca, Fe, Cu, Mg, Mn, Li, Al, Cr, Ni and Zn;

the organic developer is stored in a container before developing, the container having an inner wall contacting with the organic developer, the inner wall being made from a perfluoro resin; and

the organic developer is filtered through a polytetrafluoroethylene filter before the developing step (C).

2. The pattern forming method according to claim 1, further comprising:

performing a washing by using an organic rinsing liquid after the developing of the exposed film using the organic developer,

wherein the organic rinsing liquid contains 1 ppm or less of alkylolefin having a carbon number of 22 or less, and 5 ppm or less of a metal element concentration of each of Na, K, Ca, Fe, Cu, Mg, Mn, Li, Al, Cr, Ni, and, Zn.

3. The pattern forming method according to claim 2,

wherein the organic rinsing liquid is 4-methyl-2-pentanol or butyl acetate.

4. The pattern forming method according to claim 1,

wherein the developing of the exposed film using the organic developer is performed by using a developing apparatus mounted with the polytetrafluoroethylene filter for a processing liquid, and

the organic developer passes through the polytetrafluoroethylene filter.

5. A method of manufacturing an electronic device, the method comprising the pattern forming method according to claim 1.

6. An electronic device manufactured by the method according to claim 5.

7. The pattern forming method according to claim 2, wherein the organic rinsing liquid is stored in a second container before performing a washing, the second container having an inner wall contacting with the organic rinsing liquid, the inner wall being made from a perfluoro resin; and

the rinsing liquid is filtered through a polytetrafluoroethylene filter before performing the washing.

8. The pattern forming method according to claim 1, wherein the organic developer contains at least one selected from the group consisting of a ketone-based solvent, an ester-based solvent, an alcohol-based solvent, an amide-based solvent and an ether based solvent.

9. The pattern forming method according to claim 1, wherein the organic developer is butyl acetate.

10. The pattern forming method according to claim 2, wherein the organic rinsing liquid contains at least one selected from the group consisting of a ketone-based solvent, an ester-based solvent, an alcohol-based solvent, an amide-based solvent and an ether based solvent.

11. The pattern forming method according to claim 2, wherein the organic rinsing liquid is 4-methyl-2-pentanol or butyl acetate.

12. The pattern forming method according to claim 1, wherein the polytetrafluoroethylene filter has a pore size of 0.1 μm or less.

13. The pattern forming method according to claim 1, wherein the polytetrafluoroethylene filter has a pore size of 0.05 μm or less.

14. The pattern forming method according to claim 1, wherein the organic developer is stored in a container for one or more days before developing.