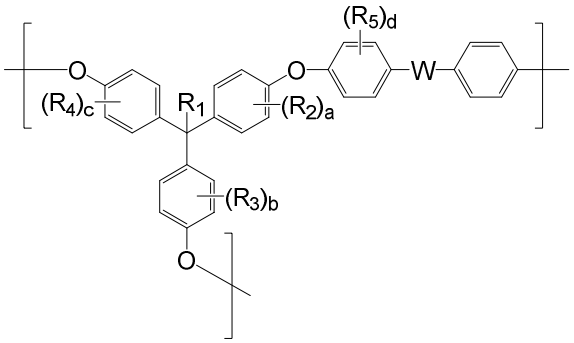
CLAIMS

1. A composition forming a wafer-edge-protection film on a peripheral edge of a substrate, comprising:

a polymer (A) represented by the following general formula (1); and

a solvent,



(1)

wherein “W” represents $-SO_2-$, -C(=O)-, or -O-; R_1, R_2, R_3, R_4, and R_5 each independently represent a halogen atom, a monovalent organic group having 1 to 3 carbon atoms, or a hydroxy group; and “a”, “b”, “c”, and “d” each independently represent an integer of 0 to 4, and

wherein the solvent is a mixture of a high-boiling-point solvent having a boiling point of 180°C or more and a low-boiling-point solvent having a boiling point of less than 180°C.

2. The composition for forming a wafer-edge-protection film according to claim 1, wherein the polymer (A) has a weight-average molecular weight of 1,000 to 30,000, wherein the weight-average molecular weight is a weight-average molecular weight in terms of polystyrene measured by gel permeation chromatography using tetrahydrofuran as an eluent.

3. The composition for forming a wafer-edge-

protection film according to claim 1 or 2, wherein the polymer (A) is contained in 10 mass% or more based on 100 mass% of the composition.

4. The composition for forming a wafer-edge-protection film according to any one of claims 1 to 3, further comprising one or more kinds of:

a crosslinking agent;

a surfactant;

an acid generator; and

a plasticizer.

5. A wafer-edge-protection film forming method for forming a wafer-edge-protection film on a peripheral edge of a substrate, comprising the steps of:

(i) coating a peripheral edge of the substrate with the composition for forming a wafer-edge-protection film according to any one of claims 1 to 4 to obtain a coating film; and

(ii) curing the coating film by heat or optical irradiation to form the wafer-edge-protection film on the peripheral edge of the substrate.

6. The wafer-edge-protection film forming method according to claim 5, wherein

in the step (i), in addition to an edge surface on a front surface side of the peripheral edge of the substrate, the composition for forming a wafer-edge-protection film is coated also on an edge surface on a rear surface side of the peripheral edge of the substrate; and

in the step (ii), the wafer-edge-protection film is formed also on the edge surface on the rear surface

side of the substrate.

7. The wafer-edge-protection film forming method according to claim 5 or 6, wherein the coating in the step (i) is performed using a spin coating method, so that the wafer-edge-protection film is not formed on areas other than the peripheral edge of the substrate.

8. The wafer-edge-protection film forming method according to any one of claims 5 to 7, wherein, in the step (ii), the coating film is cured by heat treatment at a temperature of 100°C or more and 800°C or less for 10 seconds to 7,200 seconds.

9. A patterning process in which a wafer-edge-protection film is formed on a peripheral edge of a substrate to be processed on which a patterned film is formed and a pattern is formed on the substrate to be processed, comprising the steps of:

(I-1) applying the composition for forming a wafer-edge-protection film according to any one of claims 1 to 4 onto a peripheral edge of a substrate to be processed on which a patterned film is formed to obtain a coating film;

(I-2) curing the coating film by a heat treatment or optical irradiation to form the wafer-edge-protection film on the peripheral edge of the substrate;

(I-3) forming a pattern on the substrate to be processed by dry etching while using the patterned film as a mask; and

(I-4) removing the wafer-edge-protection film.

10. A patterning process in which a wafer-edge-

protection film is formed on a peripheral edge of a substrate to be processed and a pattern is formed on the substrate to be processed, comprising the steps of:

(II-1) applying the composition for forming a wafer-edge-protection film according to any one of claims 1 to 4 onto a peripheral edge of a substrate to be processed to obtain a coating film;

(II-2) curing the coating film by heat treatment or optical irradiation to form a wafer-edge-protection film on the peripheral edge of the substrate to be processed;

(II-3) forming a resist upper layer film pattern on the substrate to be processed, and forming a pattern on the substrate to be processed by dry etching while using the resist upper layer film pattern as a mask; and

(II-4) removing the wafer-edge-protection film.

11. The patterning process according to claim 9, wherein

in the step (I-1), in addition to an edge surface on a front surface side of the peripheral edge of the substrate, the composition for forming a wafer-edge-protection film is applied also onto an edge surface on a rear surface side of the peripheral edge of the substrate; and

in the step (I-2), the wafer-edge-protection film is formed also on the edge surface on the rear surface side of the substrate.

12. The patterning process according to claim 10, wherein

in the step (II-1), in addition to an edge surface of the peripheral edge on the front surface side of the

substrate, the composition for forming a wafer-edge-protection film is applied also onto an edge surface of the peripheral edge on a rear surface side of the substrate; and

in the step (II-2), the wafer-edge-protection film is formed also on an edge surface on the rear surface side of the substrate.