

What is claimed is:

1. A substrate cleaning apparatus that cleans a substrate while rotating the substrate, the substrate cleaning apparatus comprising:

a first cleaning liquid supplier that sprays cleaning liquid in a spray shape at a first spraying angle toward a center of the substrate;

a second cleaning liquid supplier that sprays cleaning liquid in a spray shape at a second spraying angle greater than the first spraying angle toward an area between the center of the substrate and edge of the substrate; and,

a cleaner that comes into contact with the substrate and cleans the substrate,

wherein the first cleaning liquid supplier and the second cleaning liquid supplier spray cleaning liquid in a direction perpendicular to a longitudinal direction of the cleaner, and

a horizontal component of a spraying direction from the second cleaning liquid supplier has an identical direction to a direction of a moving point on a rotational surface of the substrate and the cleaner.

2. The substrate cleaning apparatus according to claim 1, wherein

a line that connects the first cleaning liquid supplier and a center of an arrival area of the cleaning liquid sprayed from the first cleaning liquid supplier is perpendicular to a longitudinal direction of the arrival area, and

a line that connects the second cleaning liquid supplier and a center of an arrival area of the cleaning liquid sprayed from the second cleaning liquid supplier is perpendicular to a longitudinal direction of the arrival area.

3. A substrate cleaning apparatus that cleans a substrate while rotating the substrate, the substrate cleaning apparatus comprising:

a first cleaning liquid supplier that sprays cleaning liquid in a spray shape at a first spraying angle toward the center of the substrate;

a second cleaning liquid supplier that sprays cleaning liquid in a spray shape at a second spraying angle greater than the first spraying angle toward an area between the center of the substrate and an edge of the substrate; and

a cleaner that comes into contact with the substrate and cleans the substrate,

wherein the first cleaning liquid supplier and/or the second cleaning liquid supplier comprises a first nozzle that sprays pure water and a second nozzle that sprays chemical liquid,

the first nozzle is located closer to a plane

including the substrate than the second nozzle,

a horizontal component of a chemical spraying direction from the second nozzle has an identical direction to a direction of a moving point on a rotational surface of the cleaner,

and

the second nozzle sprays chemical liquid toward an area including the center of the substrate and the edge of the substrate.

4. The substrate cleaning apparatus according to claim 3, wherein

the first cleaning liquid supplier and/or the second cleaning liquid supplier comprises a first nozzle that sprays pure water and a second nozzle that sprays chemical liquid, and

the chemical liquid sprayed from the second nozzle reaches closer to the cleaner than the pure water sprayed from the first nozzle.

5. The substrate cleaning apparatus according to claim 1, wherein

the first cleaning liquid supplier and the second cleaning liquid supplier spray cleaning liquid to an upper surface of the substrate, and

a spraying direction of the first cleaning liquid supplier is identical to a spraying direction of the second

cleaning liquid supplier.

6. The substrate cleaning apparatus according to claim 1, wherein

the first cleaning liquid supplier and the second cleaning liquid supplier spray cleaning liquid to a lower surface of the substrate, and

a spraying direction of the first cleaning liquid supplier is opposite to a spraying direction of the second cleaning liquid supplier.

7. The substrate cleaning apparatus according to claim 1, further comprising:

a roll-shaped cleaner that comes into contact with the substrate while being rotated and cleans the substrate,

wherein the second cleaning liquid supplier sprays cleaning liquid to an area, where the substrate and the cleaner contact with each other and rotation directions of the substrate and the cleaner coincide with each other, in a direction identical to the rotation directions.

8. The substrate cleaning apparatus according to claim 7, wherein an amount of cleaning liquid sprayed by the second cleaning liquid supplier is greater than an amount of cleaning liquid sprayed by the first cleaning liquid supplier.

9. The substrate cleaning apparatus according to claim 1,

wherein

the first cleaning liquid supplier comprises:

a first pure water nozzle that sprays pure water supplied from a first pure water supply pipe, and

a first chemical liquid nozzle that sprays chemical liquid supplied from a first chemical liquid supply pipe,

the second cleaning liquid supplier comprises:

a second pure water nozzle that sprays pure water supplied from a second pure water supply pipe different from the first pure water supply pipe, and

a second chemical liquid nozzle that sprays chemical liquid supplied from a second chemical liquid supply pipe different from the first chemical liquid supply pipe,

the first pure water supply pipe and the second pure water supply pipe respectively have flow rate adjusting functions different from each other, and

the first chemical liquid supply pipe and the second chemical liquid supply pipe respectively have flow rate adjusting functions different from each other.

10. The substrate cleaning apparatus according to claim 1, wherein the first cleaning liquid supplier and the second cleaning liquid supplier uniformly spray cleaning liquid.

11. A substrate cleaning method comprising, while spraying, from a first cleaning liquid supplier, cleaning liquid in a

spray shape at a first spraying angle toward a center of a rotating substrate, spraying, from a second cleaning liquid supplier, cleaning liquid in a spray shape at a second spraying angle greater than the first spraying angle toward an area between the center of the substrate and an edge of the substrate

wherein the first cleaning liquid supplier and the second cleaning liquid supplier spray cleaning liquid in a direction perpendicular to a longitudinal direction of a cleaner that comes into contact with the substrate and cleans the substrate, and

~~the second cleaning liquid supplier sprays cleaning liquid in a direction identical to a rotation direction of the substrate and identical to a rotation direction of the cleaner~~
a horizontal component of a spraying direction from the second cleaning liquid supplier has an identical direction to a direction of a moving point on a rotational surface of the substrate and the cleaner.

12. The substrate cleaning method according to claim 11, wherein the substrate is a substrate which has been processed by a substrate polishing apparatus that polishes a surface or a bevel of the substrate.

13. The substrate cleaning method according to claim 11, further comprising:

holding the substrate by a first roller and a second roller in a vertical direction; and

sandwiching the substrate with a first roll sponge that comes into contact with a first surface of the substrate and a second roll sponge that comes into contact with a second surface of the substrate, the first roll sponge and the second roll sponge facing each other and extending in a common horizontal plane,

wherein the first cleaning liquid supplier supplies the cleaning liquid toward the center of the first surface of the rotating substrate, and the second cleaning liquid supplier supplies the cleaning liquid toward the area between the center of the substrate and the edge of the substrate.

14. A substrate processing apparatus comprising:

a substrate polishing apparatus that polishes a surface or a bevel of a substrate;

the substrate cleaning apparatus according to one of claims 1-10 that receives the substrate polished by the substrate polishing apparatus to clean the substrate; and

a housing that houses the substrate polishing apparatus and the substrate cleaning apparatus.