

CLAIMS

1. A cleaning module comprising:

a rotary table configured to support a circular substrate and have a diameter smaller than a diameter of the substrate;

a buff cleaning portion configured to buff clean a front side of the substrate while contacting the front side of the substrate supported by the rotary table;

a buff cleaning portion movement mechanism configured to move the buff cleaning portion with respect to the substrate;

a buff cleaning portion control mechanism configured to control an operation of the buff cleaning portion movement mechanism; and

an edge cleaning portion configured to clean an edge part of the substrate while contacting the edge part of the substrate supported by the rotary table,

wherein the edge cleaning portion includes:

a first roller configured to clean an edge part of a front side of the substrate; and

a second roller configured to clean an edge part of a back side of the substrate, and

wherein directions of rotation axes of the first roller and the second roller are parallel to a surface of the table that supports the substrate,

a side surface of the first roller is in contact with the edge part of the front side of the substrate, and

a side surface of the second roller is in contact with the edge part of the back side of the substrate,

the direction of the rotation axis of the first roller is in a tangential line of the substrate at a contact portion between the first roller and the substrate, and

the direction of the rotation axis of the second roller is in a tangential line of the substrate at a contact portion between the second roller and the substrate,

the rotation direction of the first roller is switchable between a direction configured to sweep the substrate inward in a radial direction and a direction configured to sweep the

substrate outward in the radial direction.

2. ~~———— The cleaning module according to claim 1, wherein~~

~~———— the edge cleaning portion includes:~~

~~———— a first roller configured to clean an edge part of a front side of the substrate; and~~

~~———— a second roller configured to clean an edge part of a back side of the substrate.~~

3. ~~———— The cleaning module according to claim 2, wherein~~

~~———— directions of rotation axes of the first roller and the second roller are parallel to a surface of the table that supports the substrate,~~

~~———— a side surface of the first roller is in contact with the edge part of the front side of the substrate, and~~

~~———— a side surface of the second roller is in contact with the edge part of the back side of the substrate,~~

~~———— the direction of the rotation axis of the first roller is in a tangential line of the substrate at a contact portion between the first roller and the substrate, and~~

~~———— the direction of the rotation axis of the second roller is in a tangential line of the substrate at a contact portion between the second roller and the substrate,~~

~~———— the rotation direction of the first roller is switchable between a direction configured to sweep the substrate inward in a radial direction and a direction configured to sweep the substrate outward in the radial direction.~~

4. ~~———— The cleaning module according to claim 2, wherein~~

~~———— the directions of the rotation axes of the first roller and the second roller are tilted by 0° or larger and 25° or smaller from a direction perpendicular to a surface of the table that supports the substrate,~~

~~———— a bottom surface of the first roller is in contact with the edge part of the front side of the substrate, and~~

~~———— a top surface of the second roller is in contact with the edge part of the back side of the substrate.~~

52. The cleaning module according to ~~any one of claims 2 to 4~~claim 1, wherein the first roller is placed directly over the second roller.

63. The cleaning module according to ~~any one of claims 2 to 4~~, wherein

———A cleaning module comprising:

a rotary table configured to support a circular substrate and have a diameter smaller than a diameter of the substrate;

a buff cleaning portion configured to buff clean a front side of the substrate while contacting the front side of the substrate supported by the rotary table;

a buff cleaning portion movement mechanism configured to move the buff cleaning portion with respect to the substrate;

a buff cleaning portion control mechanism configured to control an operation of the buff cleaning portion movement mechanism; and

an edge cleaning portion configured to clean an edge part of the substrate while contacting the edge part of the substrate supported by the rotary table,

wherein the edge cleaning portion includes:

a first roller configured to clean an edge part of a front side of the substrate; and

a second roller configured to clean an edge part of a back side of the substrate, and

the first roller is placed in an upstream of the second roller in a rotation direction of the substrate,

the direction of the rotation axes of the first roller and the second roller are parallel to the front surface and the back surface of the substrate.

7. ———~~The cleaning module according to claim 1, wherein~~

———~~the edge cleaning portion includes a roller,~~

———~~a direction of a rotation axis of the roller is perpendicular to a surface of the table that supports the substrate, and~~

———~~a side surface of the roller is in contact with an edge part of the substrate.~~

8. ———~~The cleaning module according to claim 7, wherein~~

~~the roller has a groove having a shape matching a shape of the edge part of the substrate on the side surface.~~

9. ~~The cleaning module according to claim 8, wherein~~

~~the cleaning module has a conditioner for conditioning the shape of the groove.~~

104. The cleaning module according to any one of claims 1 to 93, further comprising an edge cleaning portion movement mechanism for moving at least a part of the edge cleaning portion.

115. The cleaning module according to claim 104, further comprising:

an edge cleaning portion control mechanism; and

a sensor configured to detect a position of the edge part of the substrate and/or a pressing force between the edge cleaning portion and the substrate, wherein

the edge cleaning portion control mechanism controls an operation of the edge cleaning portion movement mechanism based on an output of the sensor so as to compensate for a positional deviation of the substrate and/or a change of the pressing force between the edge cleaning portion and the substrate.

126. ~~The cleaning module according to any of claims 2 to 5, further comprising:~~

~~A cleaning module comprising:~~

~~a rotary table configured to support a circular substrate and have a diameter smaller than a diameter of the substrate;~~

~~a buff cleaning portion configured to buff clean a front side of the substrate while contacting the front side of the substrate supported by the rotary table;~~

~~a buff cleaning portion movement mechanism configured to move the buff cleaning portion with respect to the substrate;~~

~~a buff cleaning portion control mechanism configured to control an operation of the buff cleaning portion movement mechanism; and~~

~~an edge cleaning portion configured to clean an edge part of the substrate while contacting the edge part of the substrate supported by the rotary table,~~

wherein the edge cleaning portion includes:

a first roller configured to clean an edge part of a front side of the substrate; and

a second roller configured to clean an edge part of a back side of the substrate.

the cleaning module further comprising:

an edge cleaning portion movement mechanism for moving at least a part of the edge cleaning portion;

an edge cleaning portion control mechanism; and

a sensor configured to detect a position of the edge part of the substrate and/or a pressing force between the edge cleaning portion and the substrate, wherein

the edge cleaning portion control mechanism controls an operation of the edge cleaning portion movement mechanism so as to move the first roller and the second roller at a position away from the substrate until they come into contact with each other; to measure a pressing force between the first roller and the second roller; to calculate a pressing force between the edge cleaning portion and the substrate; to adjust positions of the first roller and the second roller with the edge cleaning portion movement mechanism such that the pressing force between the edge cleaning portion and the substrate; to move the first roller and the second roller toward the substrate when the pressing force between the edge cleaning portion and the substrate reaches a desired value; and to start the cleaning the edge portion of the substrate with the first roller and the second roller bringing into contact with the substrate.

137. A substrate processing apparatus comprising:

a polishing portion configured to polish a substrate;

the cleaning module according to any one of claims 1 to 126; and

a transfer mechanism configured to transfer the substrate between the polishing portion and the cleaning module.

~~14. A method of forming a groove on a side surface of the roller in the cleaning module according to claim 7, the method comprising~~

~~scraping a side surface of the roller by using a conditioner having a shape matching~~

| a shape of the edge part of the substrate.