

What is claimed is:

1. A substrate washing device for washing a substrate comprising:
an arm;

a two-fluid jet nozzle configured to generate a jet flow in which liquid is mixed with gas and to supply the jet flow to a first surface of the substrate, which is supported on a~~the~~ leading end of the arm and moving~~ing~~ toward the~~an~~ outer circumference of the first surface of the substrate from the center of the first surface of a~~the~~ substrate by the~~a~~ rotation of the arm, to supply a jet flow, which is generated by mixing ultrapure water (DIW) with gas, onto the substrate; and

an on-arm washing liquid supply ~~spray~~ nozzle which is provided in the arm to supply a washing~~chemical~~ liquid, which has conductivity, to the first ~~upper~~ surface of the substrate in the~~a~~ vicinity of the two-fluid jet nozzle;

a single tube nozzle configured to supply a rinse liquid to the center of the first surface of the substrate; and

a control unit configured to control the substrate washing device so that the rinse liquid from the single tube nozzle is supplied in front of the center of the first surface of the substrate to form a liquid flow toward the center of the first surface of the substrate at the same time that the jet flow from the two-fluid jet nozzle and the washing liquid, which has conductivity, are simultaneously discharged while the arm rotates,

wherein the on-arm washing liquid supply nozzle is provided at a position (a) which is proximate the two dimensional center of the first surface with respect to the two-fluid jet nozzle and on an upstream side in a rotational direction of a first portion of the first surface of the substrate when a jet flow is discharged from the two-fluid jet nozzle onto the substrate while the arm rotates from the center to the outer circumference of the substrate and (b) at which the washing~~chemical~~ liquid, which has conductivity, is~~can be~~ supplied to the~~a~~ vicinity of the~~a~~ washing location at which the jet flow discharged from the two-fluid jet nozzle collides with the first surface of the ~~substrate surface.~~

2. A substrate washing device for washing a substrate comprising:
an arm;

a two-fluid jet nozzle configured to generate a jet flow in which liquid is mixed with gas and to supply the jet flow to a first surface of the substrate, which is supported on a leading end of the arm and moved toward an outer circumference of the substrate from the center of the first surface of the substrate by a rotation of the arm;

an on-arm spray nozzle which is provided in the arm to supply a chemical liquid, which has conductivity, to the first surface of the substrate in a vicinity of the two-fluid jet nozzle;

a single tube nozzle configured to supply a rinse liquid to the center of the first surface of the substrate; and

a control unit configured to control the substrate washing device so that the rinse liquid from the single tube nozzle is supplied in front of the center of the first surface of the substrate to form a liquid flow toward the center of the first surface of the substrate at the same time that the jet flow from the two-fluid jet nozzle and the chemical liquid, which has conductivity, are simultaneously discharged while the arm rotates,

wherein the on-arm spray nozzle is provided at a position (a) which is proximate the two dimensional center of the first surface with respect to the two-fluid jet nozzle and on an upstream side in a rotational direction of a first portion of the first surface of the substrate when a jet flow is discharged from the two-fluid jet nozzle onto the substrate while the arm rotates from the center to the outer circumference of the substrate and (b) the on-arm spray nozzle is provided so as to be inclined with respect to the vertical direction in a direction toward a washing location by the two-fluid jet nozzle, at which the jet flow discharged from the two-fluid jet nozzle collides with the first surface of the substrate.

3. The substrate washing device according to claim 1, wherein the substrate to be washed by the washing device is a polished substrate by a polishing unit.

4. The substrate washing device according to claim 1, wherein the

control unit is disposed inside a housing of a substrate processing apparatus which also houses the substrate washing device.

~~2. The washing device according to claim 1,~~

~~wherein the liquid-landing area by the on-arm spray nozzle is disposed in an area up to 180° rotation in the forward direction of a rotation direction of the substrate from the washing location by the jet flow of the two-fluid jet nozzle.~~

~~3. The washing device according to claim 1, wherein the two-fluid jet nozzle is supported at the leading end portion of the arm and the spray nozzle is provided in the vicinity of the two-fluid jet nozzle, and the arm is rotatably attached to a column at the other leading end portion of the arm.~~

~~4. A washing device comprising:~~

~~a substrate rotation mechanism configured to hold a substrate and rotate the substrate about a central axis of the substrate as a rotary axis;~~

~~a first single tube nozzle configured to discharge a first washing liquid toward an upper surface of the substrate held by the substrate rotation mechanism; and~~

~~a spray nozzle configured to spray a second washing liquid toward the upper surface of the substrate held by the substrate rotation mechanism;~~

~~wherein a liquid-landing position of the first washing liquid is located in an area up to a 180° rotation in a reverse direction of a rotational direction of the substrate from a liquid-landing position of the second washing liquid.~~

~~5. A washing method comprising:~~

~~rotating a substrate about a central axis of the substrate as a rotary axis; and~~

~~—discharging a first washing liquid toward an upper surface of the substrate, the first washing liquid being landed in front of the center of the substrate, and a liquid flow on the upper surface of the substrate after landing being passed through the center of~~

~~the substrate,~~

~~wherein a liquid-landing position of the first washing liquid is located in an area up to a 180° rotation in a reverse direction of a rotational direction of the substrate from a liquid-landing position of the second washing liquid.~~