opening degree of the back pressure valve 35c to be a second valve opening degree that is greater than the first valve opening degree (Step S108). For example, the controller 71 fully opens the back pressure valve 35c. Thus, ozonated water retained in the processing tank 31 is depressurized.

[0085] According to the embodiment, prior to removing the lid body 37 from the processing tank 31 that is to be performed later, ozonated water in the processing tank 31 is depressurized. Therefore, the lid body 37 can be removed in a state where an internal pressure from ozonated water in the processing tank 31 to the lid body 37 is relieved, and thus a situation where ozonated water scatters from the processing tank 31 can be avoided.

[0086] Subsequently, the controller 71 judges whether or not a detection value of the pressure sensor 35b has become a prescribed value or less (Step S109). The controller 71 repeats a judgement process in Step S109 until a detection value of the pressure sensor 35b becomes the prescribed value or less (Step S109: No).

[0087] On the other hand, in a case where it is judged that a detection value of the pressure sensor 35b has become the prescribed value or less in Step S109 (Step S109: Yes), the controller 71 controls the movement mechanisms 381 to release the locking members 38 from pushing the lid body 37. Thereafter, the controller 71 controls the movement mechanism 371 to remove the lid body 37 from the opening 31a of the processing tank 31 (Step S110).

[0088] Thereafter, the controller 71 opens the valve 36b for a predetermined time interval to discharge ozonated water from the processing tank 31.

[0089] Subsequently, a rinsing process on the wafer W is

[0131] Subsequently, the controller 71 controls a valve opening degree of the back pressure valve 35c to be a second valve opening degree that is greater than the first valve opening degree (Step S310). For example, the controller 71 fully opens the back pressure valve 35c. Thus, a chemical liquid retained in the processing tank 31 is depressurized.

[0132] Subsequently, the controller 71 judges whether or not a detection value of the pressure sensor 35b has become a prescribed value or less (Step S311). The controller 71 repeats a judgement process in Step S311 until a detection value of the pressure sensor 35b becomes the prescribed value or less (Step S311: No).

[0133] On the other hand, in a case where it is judged that a detection value of the pressure sensor 35b has become the prescribed value or less in Step S311 (Step S311: Yes), the controller 71 controls the movement mechanisms 381 to release the locking members 38 from pushing the lid body 37. Thereafter, the controller 71 controls the movement mechanism 371 to remove the lid body 37 from the opening 31a of the processing tank 31 (Step S312).

[0134] Thereafter, the controller 71 opens the valve 36b for a predetermined time interval to discharge a chemical liquid from the processing tank 31.

[0135] Subsequently, a rinsing process on the wafer W is performed in the substrate processing apparatus 1 (Step S313). Specifically, the controller 71 opens the valves 22d and 24d. Thus, DIW as a rinsing liquid is retained in the processing tank 31, and the wafer W is immersed in DIW. Thus, a chemical liquid is removed from the wafer W.

[0136] Thereafter, the controller 71 closes the valves 22d and 24d, and opens the valve 36d for a predetermined

CLAIMS

Claim 1. A substrate processing apparatus (1) comprising:

a processing tank (31) having an opening (31a) in an upper portion thereof that immerses and processes a substrate (W) in a chemical liquid;

a lid body (37) configured to be capable of sealing the opening (31a) of the processing tank (31);

a chemical liquid supply unit (34) that supplies the chemical liquid to the processing tank (31);

a pressurizing unit (63) that pressurizes the chemical liquid on an upstream side of the chemical liquid supply unit (34); and

a controller (71) that controls each unit, wherein

the controller (71) is further configured to:

immerse the substrate (W) in the chemical liquid retained in the processing tank (31);

seal the opening (31a) of the processing tank (31) by the lid body (37); and

supply the chemical liquid pressurized by the pressurizing unit (63) to the processing tank (31) from the chemical liquid supply unit (34) to pressurize the chemical liquid retained in the processing tank (31).

Claim 2. The substrate processing apparatus (1) according to claim 1, further comprising:

a chemical liquid discharge unit (35) that discharges the chemical liquid from the processing tank (31), wherein

the controller (71) is further configured to:

in supplying the chemical liquid pressurized by the pressurizing unit (63) to the processing tank (31) from the chemical liquid supply unit (34), maintain a discharge amount of the chemical liquid discharged from the chemical

liquid discharge unit (35) to be a predetermined value.

Claim 3. The substrate processing apparatus (1) according to claim 2, wherein

the chemical liquid discharge unit (35) includes:

a discharge path (35a) connected to a position that is higher than the substrate (W) and that is lower than the opening (31a) in the processing tank (31); and

a flowmeter (35d) and a back pressure valve (35c) that are provided in the discharge path (35a), wherein

the controller (71) is further configured to:

control a valve opening degree of the back pressure valve (35c) to be a first valve opening degree such that a measurement value of the flowmeter (35d) is maintained to be a predetermined value.

Claim 4. The substrate processing apparatus (1) according to claim 3, wherein

the controller (71) is further configured to:

stop supplying the pressurized chemical liquid from the chemical liquid supply unit (34) after processing of the substrate (W) with the chemical liquid has ended in the processing tank (31); and thereafter

control the valve opening degree of the back pressure valve (35c) to be a second valve opening degree to depressurize the chemical liquid retained in the processing tank (31), the second valve opening degree being greater than the first valve opening degree.

Claim 5. The substrate processing apparatus (1) according to claim 4, wherein

the chemical liquid discharge unit (35) includes a pressure sensor (35b) provided on an upstream side of the

flowmeter (35d) and the back pressure valve (35c) in the discharge path (35a), and

the controller (71) is further configured to:

in a case where a detection value of the pressure sensor (35b) is a prescribed value or less, remove the lid body (37) from the opening (31a) of the processing tank (31).

Claim 6. The substrate processing apparatus (1) according to claim 1, further comprising:

another chemical liquid supply unit (33) that supplies a chemical liquid to the processing tank (31) at a flow rate greater than a flow rate of the chemical liquid supplied to the processing tank (31) from the chemical liquid supply unit (34), wherein

the controller (71) is further configured to:

prior to starting processing of the substrate (W) with the chemical liquid in the processing tank (31), supply the chemical liquid to the processing tank (31) from the other chemical liquid supply unit (33) to retain the chemical liquid in the processing tank (31).

Claim 7. The substrate processing apparatus (1) according to claim 1, further comprising:

a locking member (38) provided to be insertable into and removable from an insertion hole formed on an upper side of the opening (31a) in a side wall of the processing tank (31) to push the lid body (37) toward the opening (31a).

Claim 8. The substrate processing apparatus (1) according to claim 1, further comprising:

a light irradiation unit (80) provided on the

processing tank (31), and irradiates the substrate (W) with light having a wavelength that permits the chemical liquid to be transmissive to the light, wherein

the controller (71) is further configured to:

while the chemical liquid retained in the processing tank (31) is pressurized, irradiate the substrate (W) with the light having the wavelength that permits the chemical liquid to be transmissive to the light to heat the substrate (W) by using the light irradiation unit (80).

Claim 9. The substrate processing apparatus (1) according to claim 8, wherein

the wavelength of the light is 350 (nm) or more and 600 (nm) or less.

Claim 10. The substrate processing apparatus (1) according to claim 8, wherein

the processing tank (31) includes a light transmitting portion (31c) on at least one of double side walls respectively facing a main surface and a back surface that is a reverse side of the main surface of the substrate (W), the light transmitting portion (31c) being in contact with the chemical liquid and being transmissive to the light, and

the light irradiation unit (80) is located on an outer surface (31c1) of the light transmitting portion (31c) that is opposite to an inner surface of the light transmitting portion (31c) that is in contact with the chemical liquid.

Claim 11. The substrate processing apparatus (1) according to any one of claims 1 to 10, wherein

the chemical liquid is ozonated water, SC1 (mixed

solution of ammonia and aqueous hydrogen peroxide), SC2 (mixed solution of hydrochloric acid and aqueous hydrogen peroxide), aqueous hydrogen peroxide (H_2O_2), diluted hydrofluoric acid (DHF), phosphoric acid (H_3PO_4), sulfuric acid (H_2SO_4), SPM (mixed solution of sulfuric acid and aqueous hydrogen peroxide), a mixed solution of hydrofluoric acid and hydrogen water, a mixed solution of ammonia and hydrogen water, or a mixed solution of hydrochloric acid and hydrogen water.

Claim 12. A substrate processing method to be executed by using a substrate processing apparatus (1) comprising: a processing tank (31) having an opening (31a) in an upper portion thereof that immerses and processes a substrate (W) in a chemical liquid; a lid body (37) configured to be capable of sealing the opening (31a) of the processing tank (31); a chemical liquid supply unit (34) that supplies the chemical liquid to the processing tank (31); and a pressurizing unit (63) that pressurizes the chemical liquid on an upstream side of the chemical liquid supply unit (34), the substrate processing method comprising:

immersing the substrate (W) in the chemical liquid retained in the processing tank (31);

sealing the opening (31a) of the processing tank (31) by the lid body (37); and

supplying the chemical liquid pressurized by the pressurizing unit (63) to the processing tank (31) from the chemical liquid supply unit (34) to pressurize the chemical liquid retained in the processing tank (31).

Claim 13. A computer-readable storage medium to be read by using a substrate processing apparatus (1) comprising: a processing tank (31) having an opening (31a) in an upper

portion thereof that immerses and processes a substrate (W) in a chemical liquid; a lid body (37) configured to be capable of sealing the opening (31a) of the processing tank (31); a chemical liquid supply unit (34) that supplies the chemical liquid to the processing tank (31); and a pressurizing unit (63) that pressurizes the chemical liquid on an upstream side of the chemical liquid supply unit (34), the computer-readable storage medium non-temporarily storing therein a program for the computer to realize a process comprising:

immersing the substrate (W) in the chemical liquid retained in the processing tank (31);

sealing the opening (31a) of the processing tank (31) by the lid body (37); and

supplying the chemical liquid pressurized by the pressurizing unit (63) to the processing tank (31) from the chemical liquid supply unit (34) to pressurize the chemical liquid retained in the processing tank (31).