

Claims:

1. A substrate processing apparatus including a processing chamber in which a substrate is processed in a depressurized atmosphere and a transfer chamber connected to the processing chamber through a gate, the substrate processing apparatus comprising:
- 5 a first gas supply unit configured to supply an inert gas into the transfer chamber;
- 10 a second gas supply unit configured to supply an inert gas to the gate; and
- a gas exhaust unit configured to exhaust an atmosphere in the transfer chamber,
- wherein the inert gas supplied from the second gas supply unit is heated,
- 15 wherein a substrate to be processed and a transfer arm holding the substrate to be processed enter the processing chamber, the substrate and the transfer arm pass through the heated inert gas supplied from the second gas supply unit at the gate, for reducing cooling of the substrate and the transfer arm, and
- 20 wherein a nozzle for supplying the inert gas from the second gas supply unit to cover the gate is provided below the gate, and a curtain of the inert gas is formed upward from a position below the gate.
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2. The substrate processing apparatus of claim 1, further comprising:

a load-lock chamber connected to the transfer chamber through another gate, an atmosphere in the load-lock chamber being switchable between an atmospheric pressure atmosphere and a depressurized atmosphere; and

a third gas supply unit configured to supply an inert gas to said another gate.

3. The substrate processing apparatus of claim 2, wherein the inert gas supplied from the third gas supply unit is heated.

4. The plasma processing apparatus of claim 1, wherein the first gas supply unit is provided at one end portion of the transfer chamber, and

the gas exhaust unit is provided at the other end of the transfer chamber.

5. The substrate processing apparatus of claim 1, wherein a transfer arm for transferring a substrate is provided in the transfer chamber, and

the transfer arm holds two substrates in an overlapped state with a gap between the two substrates.

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6. A substrate processing method using a substrate

processing apparatus including a processing chamber in which a substrate is processed in a depressurized atmosphere and a transfer chamber connected to the processing chamber through a gate, the method comprising:

5 supplying an inert gas from a first gas supply unit into the transfer chamber during the processing of the substrate in the processing chamber and transfer of the substrate between the processing chamber and the transfer chamber, and

10 supplying an inert gas from a second gas supply unit to the gate when the gate is opened to transfer the substrate between the processing chamber and the transfer chamber,

 wherein the inert gas supplied from the second gas
15 supply unit is heated,

 wherein a substrate to be processed and a transfer arm holding the substrate to be processed enter the processing chamber, the substrate and the transfer arm pass through the heated inert gas supplied from the second gas supply unit at
20 the gate, for reducing cooling of the substrate and the transfer arm, and

 wherein a nozzle for supplying the inert gas from the second gas supply unit to cover the gate is provided below the gate, and a curtain of the inert gas is formed upward
25 from a position below the gate.

7. The substrate processing method of claim 6, wherein the substrate processing apparatus further includes a load-lock chamber connected to the transfer chamber through another gate, an atmosphere in the load-lock chamber being
5 switchable between an atmospheric pressure atmosphere and a depressurized atmosphere, and

wherein the substrate processing method further comprises:

supplying an inert gas from the first gas supply unit
10 into the transfer chamber when the substrate is accommodated in the load-lock chamber and transferred between the load-lock chamber and the transfer chamber; and

supplying an inert gas from a third gas supply unit to another gate when said another gate is opened to transfer
15 the substrate between the load-lock chamber and the transfer chamber.

8. The substrate processing method of claim 7, wherein the inert gas supplied from the third gas supply unit is
20 heated.

9. A computer-readable storage medium storing a program operating on a computer of a control unit for controlling a substrate processing apparatus to perform the substrate
25 processing method described in claim 6.