

WHAT IS CLAIMED IS:

1. A substrate stage, comprising:

a base portion having a mounting surface on which a substrate is mounted;

an annular support provided on the base portion and configured to support the substrate along an outer peripheral side of the substrate;

an annular partition wall provided on the mounting surface and configured to divide the mounting surface into an outer region and an inner region in a radial direction of the substrate mounted on the mounting surface;

a plurality of protrusions provided on the mounting surface in the outer region and the inner region and configured to support the substrate with a gap left between an upper end surface of the partition wall and the substrate;

an outer flow path provided in the base portion and in communication with the outer region, and configured to allow a heat transfer gas supplied to a space between the substrate and the mounting surface to flow through the outer flow path;

an inner flow path provided in the base portion and in communication with the inner region, and configured to allow the heat transfer gas to flow through the inner flow path; and

an annular diffusion portion ~~provided in~~ recessed downward from the mounting surface of the base portion and configured to diffuse the heat transfer gas along a circumferential direction of the partition wall.

2. The substrate stage of Claim 1, wherein the annular diffusion portion includes an outer diffusion portion in communication with the outer region and configured to diffuse the heat transfer gas along the circumferential direction on an outer peripheral side of the partition

wall, and an inner diffusion portion in communication with the inner region and configured to diffuse the heat transfer gas along the circumferential direction on an inner peripheral side of the partition wall.

3. The substrate stage of Claim 2, wherein the outer diffusion portion includes a first outer diffusion portion opened on the mounting surface and provided along an outer circumferential surface of the partition wall, and a second outer diffusion portion opened on the mounting surface and provided at an end portion of the outer flow path.

4. The substrate stage of Claim 2, wherein the inner diffusion portion includes a first inner diffusion portion opened on the mounting surface and provided along an inner circumferential surface of the partition wall, and a second inner diffusion portion opened on the mounting surface and provided at an end portion of the inner flow path.

5. The substrate stage of Claim 3, wherein the base portion is provided with a connection path configured to bring the first outer diffusion portion and the second outer diffusion portion into communication with each other.

6. The substrate stage of Claim 4, wherein the base portion is provided with a connection path configured to bring the first inner diffusion portion and the second inner diffusion portion into communication with each other.

7. ~~The substrate stage of Claim 1,~~ A substrate stage, comprising:

a base portion having a mounting surface on which a substrate is mounted;

an annular support provided on the base portion and configured to support the substrate along an outer peripheral side of the substrate;

an annular partition wall provided on the mounting surface and configured to divide the mounting surface into an outer region and an inner region in a radial direction of the substrate mounted on the mounting surface;

a plurality of protrusions provided on the mounting surface in the outer region and the inner region and configured to support the substrate with a gap left between an upper end surface of the partition wall and the substrate;

an outer flow path provided in the base portion and in communication with the outer region, and configured to allow a heat transfer gas supplied to a space between the substrate and the mounting surface to flow through the outer flow path;

an inner flow path provided in the base portion and in communication with the inner region, and configured to allow the heat transfer gas to flow through the inner flow path; and
an annular diffusion portion provided in the base portion and configured to diffuse the heat transfer gas along a circumferential direction of the partition wall,

wherein the annular diffusion portion is provided inside the base portion and in communication with one of the outer flow path and the inner flow path, and

wherein the one of the outer flow path and the inner flow path includes an outer branch flow path extending from an outer peripheral side of the annular diffusion portion to the mounting surface, and an inner branch flow path extending from an inner peripheral side of the annular diffusion portion to the mounting surface.

8. The substrate stage of any one of Claims 1 to 7, ~~wherein the partition wall is provided with~~
further comprising a plurality of protrusions provided on the upper end surface of the partition

wall and configured to support the substrate with the gap left between the upper end surface of the partition wall and the substrate.

9. A substrate processing apparatus, comprising:

- a substrate stage of any one of Claims 1 to 8;
- a processing chamber in which the substrate stage is provided;
- a processing gas supplier configured to supply a processing gas for processing the substrate into the processing chamber; and
- a heat transfer gas supplier configured to supply the heat transfer gas.

10. A temperature control method, comprising:

supporting a substrate along an outer peripheral side of the substrate by an annular support provided on a base portion having a mounting surface on which the substrate is mounted;

dividing the mounting surface into an outer region and an inner region in a radial direction of the substrate mounted on the mounting surface by an annular partition wall provided on the mounting surface, and supporting the substrate by a plurality of protrusions provided on the mounting surface in the outer region and the inner region with a gap left between an upper end surface of the partition wall and the substrate; and

diffusing a heat transfer gas supplied to a space between the substrate and the mounting surface via an outer flow path and an inner flow path, which are provided in the base portion and in communication with the outer region and the inner region, respectively, along a circumferential direction of the partition wall by an annular diffusion portion ~~provided~~ in-recessed downward from the mounting surface of the base portion.

11. The temperature control method of Claim 10, further comprising:

diffusing the heat transfer gas along the circumferential direction of the partition wall by the annular diffusion portion, which is opened on the mounting surface and provided along an outer circumferential surface of the partition wall.

12. ~~The temperature control method of Claim 10, further comprising:~~ A temperature control method, comprising:

supporting a substrate along an outer peripheral side of the substrate by an annular support provided on a base portion having a mounting surface on which the substrate is mounted;

dividing the mounting surface into an outer region and an inner region in a radial direction of the substrate mounted on the mounting surface by an annular partition wall provided on the mounting surface, and supporting the substrate by a plurality of protrusions provided on the mounting surface in the outer region and the inner region with a gap left between an upper end surface of the partition wall and the substrate;

diffusing a heat transfer gas supplied to a space between the substrate and the mounting surface via an outer flow path and an inner flow path, which are provided in the base portion and in communication with the outer region and the inner region, respectively, along a circumferential direction of the partition wall by an annular diffusion portion provided in the base portion;

diffusing the heat transfer gas along the circumferential direction of the partition wall by the annular diffusion portion, which is provided inside the base portion and in communication with one of the outer flow path and the inner flow path; and

supplying the heat transfer gas to the space between the substrate and the mounting

surface, by one of the outer flow path and the inner flow path, which includes an outer branch flow path extending from an outer peripheral side of the annular diffusion portion to the mounting surface and an inner branch flow path extending from an inner peripheral side of the annular diffusion portion to the mounting surface.

13. The substrate processing apparatus of Claim 9, further comprising:

an exhaust mechanism configured to discharge the heat transfer gas;
a first pipe that connects the heat transfer gas supplier and the exhaust mechanism;
a second pipe that connects the heat transfer gas supplier and the exhaust mechanism;
a first valve provided in the first pipe;
a second valve provided in the second pipe;
first connection pipes that connect the first pipe and the inner flow path; and
second connection pipes that connect the second pipe and the outer flow path,
wherein the first valve is provided in the first pipe at a location between a first
connection portion where the first pipe and the first connection pipes are connected to each
other and the exhaust mechanism, and
wherein the second valve is provided in the second pipe at a location between a
second connection portion where the second pipe and the second connection pipes are
connected to each other and the exhaust mechanism.

14. The substrate processing apparatus of Claim 13, further comprising:

a third pipe that connects a portion of the first pipe between the first connection
portion and the first valve and a portion of the first pipe between the first valve and the
exhaust mechanism;

a third valve provided in the third pipe;

a first orifice provided in the third pipe at a location between the third valve and the
exhaust mechanism;

a fourth pipe that connects a portion of the second pipe between the second
connection portion and the second valve and a portion of the second pipe between the second
valve and the exhaust mechanism;

a fourth valve provided in the fourth pipe; and

a second orifice provided in the fourth pipe at a location between the fourth valve and
the exhaust mechanism.