

CLAIMS

What is claimed is:

1. A substrate support comprising:
a body configured to support a substrate during processing of the substrate,
5 wherein the body comprises a plurality of plates comprising a top plate, a first intermediate plate, a second intermediate plate and a bottom plate, wherein the plurality of plates are arranged to form a stack, and wherein the first intermediate plate is disposed on the second intermediate plate; and
a thermal void defined by an upper surface of the second intermediate plate and
10 at least one of a lower surface of the first intermediate plate or a lower surface of the top plate, wherein the thermal void is annular-shaped.
2. The substrate support of claim 1, wherein:
the plurality of plates are bonded together to form a unitary structure with at least partially sealed passages; and
15 thermal conductivity exists between the plurality of plates due to the unitary structure.
3. The substrate support of claim 1, wherein the thermal void is defined by the lower surface of the first intermediate plate and the upper surface of the second intermediate plate.
- 20 4. The substrate support of claim 1, wherein the thermal void is defined by the lower surface of the top plate and the upper surface of the second intermediate plate.
5. The substrate support of claim 1, wherein:
the thermal void is a first thermal void;
the first thermal void is defined by the lower surface of the first intermediate plate
25 and the upper surface of the second intermediate plate; and
the body comprises a second thermal void defined by the lower surface of the top plate and the upper surface of the second intermediate plate.
6. The substrate support of claim 1, wherein:
the thermal void is a first thermal void;

the substrate support comprises one or more thermal voids including the first thermal void; and

5 dimensions of the one or more thermal voids relative to dimensions of at least some of the plurality of plates provides a temperature gradient of greater than 2°C between a center and an annular outer peripheral area of the body.

7. The substrate support of claim 1, wherein:

the thermal void is a first thermal void;

the substrate support comprises one or more thermal voids including the first thermal void; and

10 dimensions of the one or more thermal voids relative to dimensions of at least some of the plurality of plates provides a temperature gradient of greater than or equal to 6°C between a center and an annular outer peripheral area of the body.

8. The substrate support of claim 1, wherein the thermal void is defined by three of the plurality of plates.

15 9. The substrate support of claim 1, wherein:

the thermal void is a first thermal void;

the body comprises a second thermal void; and

the second thermal void is annular-shaped and defined by a corresponding two or more of the plurality of plates.

20 10. The substrate support of claim 1, wherein:

the plurality of plates comprise first radially-extending channels and second radially-extending channels; and

the thermal void transfers an exclusion gas between the first radially-extending channels and the second radially-extending channels.

25 11. The substrate support of claim 1, wherein:

the plurality of plates comprise radially-extending channels and radially-extending grooves; and

the thermal void transfers gas under vacuum between the radially-extending channels and the radially-extending grooves.

12. The substrate support of claim 1, wherein:
the thermal void is a first thermal void;
the body comprises four annular-shaped thermal voids arranged in a concentric
pattern; and
5 the four annular-shaped thermal voids include the first thermal void.
13. The substrate support of claim 1, wherein the plurality of plates comprise two or
more concentric heating coils.
14. The substrate support of claim 1, wherein:
the plurality of plates comprise an inner heating element, a middle heating element
10 and an outer heating element;
the thermal void is a first thermal void;
the body comprises a second thermal void;
the first thermal void is disposed above an area between the outer heating element
and the middle heating element; and
15 the second thermal void is disposed above an area between the middle heating
element and the inner heating element.
15. The substrate support of claim 14, wherein at least one of:
heights of cross-sections of the first thermal void and the second thermal void are
different; or
20 widths of cross-sections of the first thermal void and the second thermal void are
different.
16. The substrate support of claim 14, wherein:
a height of a cross-section of the first thermal void is defined by three of the
plurality of plates; and
25 a height of a cross-section of the second thermal void is defined by two of the
plurality of plates.
17. The substrate support of claim 14, wherein at least one of:
a height of a cross-section of the first thermal void is greater than a height of a
cross-section of the second thermal void; or
30 a width of the second thermal void is greater than a width of the first thermal void.

18. A system comprising:
the substrate support of claim 1, wherein the substrate support comprises two or more heating elements and one or more sensors, and wherein the one or more sensors is configured to generate one or more temperature signals; and
- 5 a control module configured, based on the one or more temperature signals and a relationship between the thermal void and at least some of the plurality of plates, control supply of at least one of current or power to the two or more heating elements.
19. A substrate support comprising:
a body configured to support a substrate during processing of the substrate,
- 10 wherein the body comprises a plurality of plates comprising a top plate, one or more intermediate plates, and a bottom plate, and wherein the plurality of plates are arranged to form a stack; and
- a thermal void defined by two or more of the plurality of plates including at least one of the one or more intermediate plates, wherein the thermal void is annular-shaped
- 15 and concentric with the two or more of the plurality of plates.
20. A substrate support comprising:
a body configured to support a substrate during processing of the substrate, wherein the body comprises a plurality of plate layers comprising a top plate layer, one or more intermediate plate layers, and a bottom plate layer, wherein the one or more
- 20 intermediate plate layers comprise a first plate and a second plate, wherein the second plate is concentric with the first plate, and wherein the plurality of plate layers are arranged to form a stack; and
- a thermal void defined at least partially by the first plate and the second plate, wherein the thermal void is annular-shaped.