

~~WHAT IS CLAIMED IS:~~ **Claims**

1. A substrate carrier stack comprising:
a plurality of substrate carriers stacked in a vertical
_direction such that, for each pair of vertically adjacent
_substrate carriers, a lower substrate carrier supports an
_upper substrate carrier; wherein
each of the plurality of substrate carriers includes an
_outer carrier frame extending in a horizontal frame plane
_around an inner zone that includes an inner opening;
each of the plurality of substrate carriers includes a
_substrate seat to accommodate and carry a substrate within an
_inner accommodation space of the substrate carrier stack, the
_inner accommodation space is defined by the inner openings of
_the plurality of substrate carriers;
each of the plurality of substrate carriers includes, at
_the outer carrier frame, an upper supporting formation and a
_lower supporting formation, the upper supporting formation of
_the lower substrate carrier supporting the lower supporting
_formation of the upper substrate carrier;
the outer carrier frame of each of the plurality of
_substrate carriers includes a first frame web extending along
_a first frame web axis, a second frame web extending along a
_second frame web axis, a third frame web extending along a
_third frame web axis, and a fourth frame web extending along a
_fourth frame web axis;
the first frame web axis intersects the fourth frame web
_axis at a right angle at a first vertex of the first frame web
_and the fourth frame web, the first frame web and the fourth
_frame web are connected at a first frame vertex region of the
_outer carrier frame;
the first frame web axis intersects the second frame web
_axis at a right angle at a second vertex of the first frame
_web and the second frame web, the first frame web and the second frame web are
connected at a second frame vertex region of the outer carrier frame;
the third frame web axis intersects the fourth frame web
_axis at a right angle at a fourth vertex of the third frame

web and the fourth frame web, the third frame web and the fourth frame web are connected at a fourth frame vertex region of the outer carrier frame; the third frame web axis intersects the second frame web axis at a third vertex of the third frame web and the second frame web, the third frame web and the second frame web are connected at a third frame vertex region of the outer carrier frame; each of the plurality of substrate carriers includes a plurality of substrate holding arms that extend inwardly and upwardly from the outer carrier frame, overlap the inner zone, and define the substrate seat; the substrate seat is located at a distance above the outer carrier frame in the vertical direction; and each of the plurality of substrate carriers includes a first positioning formation and a second positioning formation such that, for the each pair of vertically adjacent substrate carriers, the first positioning formation of the lower substrate carrier engages with the second positioning formation of the upper substrate carrier.

2. The substrate carrier stack according to claim 1, wherein the upper supporting formation includes an upper sealing formation, and the lower supporting formation includes a lower sealing formation; a first of the upper sealing formation and the lower sealing formation includes a continuous sealing lip that extends continuously around the inner zone, and a second of the upper sealing formation and the lower sealing formation includes a continuous sealing surface strip that extends continuously around the inner zone; for the each pair of vertically adjacent substrate carriers, the lower sealing formation of the upper substrate carrier engages with the upper sealing formation of the lower substrate carrier to seal the inner zone and the inner accommodation space from an area surrounding the substrate carrier stack.

3. The substrate carrier stack according to claim 1—~~or~~

~~claim 2~~, wherein

all of the plurality of substrate carriers have a same

structure or substantially a same structure; and

the substrate carriers of the each pair of vertically

adjacent substrate carriers are stacked such that:

the first frame web of the lower substrate carrier

supports the third frame web of the upper substrate carrier,

the second frame web of the lower substrate carrier supports

the fourth frame web of the upper substrate carrier, the third

frame web of the lower substrate carrier supports the first

frame web of the upper substrate carrier, and the fourth frame

web of the lower substrate carrier supports the second frame

web of the upper substrate carrier.

4. The substrate carrier stack according to ~~any of~~

~~claims~~claim 1 ~~through 3~~, wherein

the first positioning formation and the second

positioning formation are located at identical or

substantially identical diametrically opposing portions of the

outer carrier frame of each of the plurality of substrate

carriers;

the first positioning formation of the lower substrate

carrier of the each pair of vertically adjacent substrate

carriers engages with the second positioning formation of the

upper substrate carrier of the each pair of vertically

adjacent substrate carriers only when the two substrate

carriers of the each pair of vertically adjacent substrate

carriers are stacked on each other such that the first frame

web of the lower substrate carrier supports the third frame

web of the upper substrate carrier, the second frame web of

the lower substrate carrier supports the fourth frame web of

the upper substrate carrier, the third frame web of the lower

substrate carrier supports the first frame web of the upper

substrate carrier, and the fourth frame web of the lower

substrate carrier supports the second frame web of the upper

substrate carrier.

5. The substrate carrier stack according to ~~any of~~
~~claims~~claim ~~1 through 4~~, wherein each of the plurality of substrate
_carriers includes a vertical protrusion defining a first of
_the first positioning formation and the second positioning
_formation, and a recess or opening defining a second of the
_first positioning formation and the second positioning
_formation.

6. The substrate carrier stack according to ~~any of~~
~~claims~~claim ~~1 through 5~~, wherein the plurality of substrate holding
_arms include pairs of substrate holding arms provided at
_diametrically opposed frame web portions of two of the first
_web frame, the second web frame, the third web frame, and the
_fourth web frame that are parallel or substantially parallel
_to each other.

7. The substrate carrier stack according to ~~any of~~
~~claims~~claim ~~1 through 6~~, wherein the plurality of substrate holding
_arms of each of the plurality of substrate carriers include:
a first substrate holding arm and a second substrate
_holding arm provided at one of the first frame web and the
_second frame web; and
a third substrate holding arm and a fourth substrate
_holding arm provided at the frame web of one of the third
_frame web or the fourth frame web that has the frame web axis
_thereof extending parallel or substantially parallel to the
_frame web axis of the first frame web and the second frame web
_at which the first substrate holding arm and the second
_substrate holding arm are provided.

8. The substrate carrier stack according to ~~any of~~
~~claims~~claim ~~1 through 7~~, wherein each of the plurality of substrate
_carriers includes projections that project horizontally from
_an outer peripheral surface of the outer carrier frame.

9. The substrate carrier stack according to ~~any of claims~~

claim ~~1 through 8~~, wherein each of the plurality of substrate carriers includes a first pair of projections that project from an outer peripheral surface of the outer carrier frame in a first horizontal direction and a second pair of projections that project from the outer peripheral surface of the outer carrier frame in a second horizontal direction that is different from the first horizontal direction.

10. The substrate carrier stack according to ~~any of claims~~ claim ~~1 through 9~~, further comprising a cover that is stacked on the plurality of substrate carriers and is supported by an uppermost substrate carrier of the plurality of substrate carriers.

11. The substrate carrier stack according to ~~any of claims~~ claim ~~1 through 10~~, further comprising a base on which the plurality of substrate carriers are stacked, the base supports a lowermost substrate carrier of the plurality of substrate carriers.

12. The substrate carrier according to ~~any of claims~~ claim ~~1 through 11~~, wherein the substrate seat of each of the plurality of substrate carriers defines a horizontal carrying plane which is coplanar with a lower surface of the substrate; each of the plurality of substrate carriers includes a plurality of partition webs that extend from the outer carrier frame through the inner zone to define the inner opening and two auxiliary openings of the inner zone; a first arc-shaped portion of the plurality of partition webs extends in a first space between the fourth frame web and the inner opening to define a first of the two auxiliary openings; a second arc-shaped portion of the plurality of partition webs extends in a second space between the second frame web and the inner opening to define a second of the two auxiliary

_openings;
the first auxiliary openings and the second auxiliary
_openings of the inner zones of the plurality of substrate
_carriers collectively define a first purging channel and a
_second purging channel that extend vertically parallel or
_substantially parallel to the inner accommodation space at
_opposing sides of the inner accommodation space; and
the plurality of substrate carriers include purging
_structures that create horizontal purging flows within the
_substrate carrier stack through spaces between substrates held
_by the substrate seats of the plurality of substrate carriers.

13. The substrate carrier stack according to claim 12,
_wherein
each of the plurality of substrate carriers includes a
_first partition web extending between the first frame web and
_the third frame web and includes the first arc-shaped portion
_that extends in the first space between the fourth frame web
_and the inner opening and bridges between the first frame web
_and the third frame web; and
each of the plurality of substrate carriers includes a
_second partition web extending between the first frame web and
_the third frame web and includes the second arc-shaped portion
_that extends in the second space between the second frame web
_and the inner opening and bridges between the first frame web
_and the third frame web.

14. The substrate carrier stack according to claim 12 ~~or~~
~~claim 13~~, wherein the first arc-shaped portion and the second
_arc-shaped portion of a lowermost substrate carrier or a
_predetermined number of the plurality of substrate carriers
_are located alongside a cylindrical protrusion of a base on
_which the plurality of substrate carriers are stacked, the
_cylindrical protrusion extending upwardly into the inner
_accommodation space in the vertical direction.

15. The substrate carrier stack according ~~to any of~~

~~claims~~claim 12 ~~through 14~~, further comprising:
a cover that is stacked on the plurality of substrate
_carriers and is supported by an uppermost substrate carrier of
_the plurality of substrate carriers; and
a base on which the plurality of substrate carriers are
_stacked, the base supports a lowermost substrate carrier of
_the plurality of substrate carriers; wherein
the upper supporting formation includes an upper sealing
_formation, and the lower supporting formation includes a lower
_sealing formation;
the upper sealing formation of the uppermost substrate
_carrier of the plurality of substrate carriers engages with a
_sealing formation of the cover;
the lower sealing formation of the lowermost substrate
_carrier of the plurality of substrate carriers engages with a
_sealing formation of the base to seal the inner accommodation
_space, the first purging channel, and the second purging
_channel from an area surrounding the substrate carrier stack.

16. A substrate carrier ~~stack~~ comprising:

~~a plurality of substrate carriers that are stacked on
each other and all have a same structure or substantially a
same structure to each carry a substrate within an inner
accommodation space of the substrate carrier stack; wherein
each of the plurality of substrate carriers includes
positioning formations, the positioning formations of each
pair of an upper substrate carrier and a lower substrate
carrier of the plurality of substrate carriers mutually engage
with each other when the upper substrate carrier and the lower
substrate carrier are properly positioned relative to each
other.~~

~~17. The substrate carrier stack according to claim 16,
wherein a proper relative positioning of the upper substrate
carrier and the lower substrate carrier is a relative rotation
of 180 degrees about a vertical rotation axis of the upper
substrate carrier and the lower substrate carrier.~~

~~18. A substrate carrier comprising:~~

an outer carrier frame extending in a frame plane around

_an inner zone including an inner opening;
an upper supporting formation and a lower supporting
_formation located at the outer carrier frame;
a plurality of substrate holding arms that extend
_inwardly and upwardly from the outer carrier frame, overlap
_with the inner zone, and define a substrate seat that is
_located at a distance above the outer carrier frame in a
_vertical direction of the substrate carrier to carry a substrate; and
~~substrate; and~~
a first positioning formation and a second positioning
_formation, the first positioning formation is engageable with
_a second positioning formation of a first additional substrate
_carrier that is stacked on the substrate carrier, and the
_second positioning formation is engageable with a first
_positioning formation of a second additional substrate carrier
_on which the substrate carrier is stacked.

17. ~~19~~The substrate carrier according to claim 16, wherein the substrate carrier is
integrally molded from a plastic material.

18. The substrate carrier according to claim ~~18~~, ~~wherein~~
~~the substrate carrier is integrally molded from a plastic~~
~~material.~~

~~20. The substrate carrier according to claim 18 or claim~~
~~19~~16, wherein the substrate carrier is integrally molded from
_polyether ether ketone or polycarbonate.