

CLAIMS:

- 1 1. A substrate processing system comprising:
2 a chamber body defining a transfer region;
3 a first lid plate seated on the chamber body along a first surface of the first lid
4 plate, wherein the first lid plate defines a plurality of apertures through the first lid plate;
5 a plurality of lid stacks equal to a number of apertures of the plurality of
6 apertures defined through the first lid plate, wherein the plurality of lid stacks at least
7 partially define a plurality of processing regions vertically offset from the transfer region; and
8 a second lid plate coupled with the plurality of lid stacks, wherein the plurality
9 of lid stacks are positioned between the first lid plate and the second lid plate, and wherein a
10 component of each lid stack of the plurality of lid stacks is coupled with the second lid plate.
- 1 2. The substrate processing system of claim 1, further comprising a
2 plurality of substrate supports disposed about the transfer region, each substrate support of
3 the plurality of substrate supports vertically translatable along a central axis of the substrate
4 support between a first position and a second position.
- 1 3. The substrate processing system of claim 1, wherein the first lid plate
2 further defines a recessed ledge about each aperture of the plurality of apertures in a second
3 surface of the first lid plate opposite the first surface of the first lid plate, and wherein each
4 lid stack of the plurality of lid stacks seated on the first lid plate on a separate recessed ledge
5 defined in the second surface of the first lid plate.
- 1 4. The substrate processing system of claim 1, wherein the transfer region
2 comprises a transfer apparatus rotatable about a central axis and configured to engage
3 substrates and transfer substrates among a plurality of substrate supports within the transfer
4 region.
- 1 5. The substrate processing system of claim 1, wherein the second lid
2 plate defines a plurality of apertures through the second lid plate, each aperture of the
3 plurality of apertures accessing a lid stack of the plurality of lid stacks, the substrate
4 processing system further comprising:
5 a plurality of output manifolds, each output manifold of the plurality of output
6 manifolds disposed in a separate aperture of the plurality of apertures defined through the
7 second lid plate.

1 6. The substrate processing system of claim 5, wherein the component of
2 each lid stack of the plurality of lid stacks coupled with the second lid plate is characterized
3 by a first surface facing the second lid plate, and characterized by a second surface opposite
4 the first surface.

1 7. The substrate processing system of claim 6, further comprising:
2 a first o-ring positioned on the first surface of the component of each lid stack
3 of the plurality of lid stacks coupled with the second lid plate, wherein each first o-ring
4 engages a corresponding output manifold.

1 8. The substrate processing system of claim 7, wherein the component of
2 each lid stack of the plurality of lid stacks is coupled with the second lid plate at a plurality of
3 locations with a plurality of engagement apparatuses, and wherein each engagement
4 apparatus comprises:

5 a bolt extending through the component of each lid stack and engaging the
6 second lid plate,
7 a washer seated against the bolt, and
8 a spring engaging the washer at a first end of the spring and the component of
9 each lid stack at a second end of the spring opposite the first.

1 9. The substrate processing system of claim 8, wherein each engagement
2 apparatus further comprises a clip extending about the bolt, wherein the clip is sized to seat
3 the washer along a first surface of the washer when the bolt is disengaged from the second lid
4 plate.

1 10. The substrate processing system of claim 9, wherein a gap is
2 maintained between the clip and the washer when the bolt engages the second lid plate.

1 11. The substrate processing system of claim 9, wherein the clip of each
2 engagement apparatus is a first clip, and wherein each engagement apparatus further
3 comprises a second clip extending about the bolt.

1 12. The substrate processing system of claim 11, wherein each second clip
2 is sized to seat on the washer along a second surface of the washer when the bolt is
3 disengaged from the second lid plate.

1 13. A substrate processing system comprising:
2 a chamber body defining a transfer region;
3 a first lid plate seated on the chamber body along a first surface of the first lid
4 plate, wherein the first lid plate defines a plurality of apertures through the first lid plate;
5 a plurality of lid stacks equal to a number of apertures of the plurality of
6 apertures, wherein the plurality of lid stacks at least partially define a plurality of processing
7 regions vertically offset from the transfer region, and wherein each lid stack of the plurality
8 of lid stacks comprises a gasbox; and
9 a second lid plate coupled with the plurality of lid stacks, wherein the plurality
10 of lid stacks are positioned between the first lid plate and the second lid plate, and wherein
11 the gasbox of each lid stack of the plurality of lid stacks is coupled with the second lid plate
12 by a plurality of engagement apparatuses, each engagement apparatus comprising a spring
13 compressibly engaging the gasbox with the second lid plate.

1 14. The substrate processing system of claim 13, wherein each engagement
2 apparatus further comprises:
3 a shoulder bolt extending through the gasbox and engaging the second lid
4 plate, wherein a shank of the shoulder bolt seats against the second lid plate when the
5 shoulder bolt is fully engaged with the second lid plate,
6 a washer seated against the shoulder bolt at a head of the shoulder bolt about
7 the shank, and
8 a spring engaging the washer at a first end of the spring and engaging the
9 gasbox at a second end of the spring opposite the first end of the spring.

1 15. The substrate processing system of claim 14, wherein each engagement
2 apparatus further comprises a clip disposed within the gasbox about the shoulder bolt,
3 wherein the clip is sized to seat the washer along a first surface of the washer when the
4 shoulder bolt is disengaged from the second lid plate.

1 16. The substrate processing system of claim 15, wherein a gap is
2 maintained between the clip and the washer when the shank of the shoulder bolt is seated
3 against the second lid plate.

1 17. The substrate processing system of claim 13, further comprising a
2 transfer apparatus positioned within the transfer region and rotatable about a central axis,

3 wherein the transfer apparatus is configured to engage substrates and transfer substrates
4 among a plurality of substrate supports within the transfer region.

1 18. The substrate processing system of claim 13, wherein the second lid
2 plate defines a plurality of apertures through the second lid plate, each aperture of the
3 plurality of apertures accessing a lid stack of the plurality of lid stacks, the substrate
4 processing system further comprising:
5 a plurality of output manifolds, each output manifold of the plurality of output
6 manifolds disposed in a separate aperture of the plurality of apertures defined through the
7 second lid plate.

1 19. The substrate processing system of claim 18, further comprising a
2 remote plasma unit seated on the second lid plate and fluidly coupled with each output
3 manifold of the plurality of output manifolds.

1 20. A gasbox assembly comprising:
2 a gasbox characterized by a first surface and a second surface opposite the first
3 surface, wherein a recess is defined within the gasbox from the second surface, and wherein
4 an aperture is defined through the first surface accessing the recess;
5 a first clip seated in the gasbox within the recess;
6 a bolt positioned within the recess and extending through the aperture defined
7 in the first surface of the gasbox;
8 a washer extending about the bolt and positioned between the first clip and the
9 first surface of the gasbox;
10 a second clip extending about the bolt and positioned between the washer and
11 the first surface of the gasbox; and
12 a spring positioned in the recess and engaging the washer at a first end of the
13 spring and engaging the gasbox at a second end of the spring opposite the first end of the
14 spring.