What is Claimed is:

1. A chamber lid assembly, comprising:

a housing enclosing a central channel that extends along a central axis and has an upper portion and a lower portion;

a lid plate with an upper surface comprising a planar exterior wall of a process chamber coupled directly to a lower surface of the housing and having a contoured bottom surface that extends downwardly and outwardly from a central opening coupled to the lower portion of the central channel to a peripheral portion of the lid plate, wherein a first portion of the contoured bottom surface where the contoured bottom surface meets the central channel is conical and has a first angle with respect to the central axis, wherein a second portion of the contoured bottom surface radially outward of the first portion is also conical and has a second angle with respect to the central axis, and wherein the second angle is different than the first angle;

a first heating element to heat the central channel;

a second heating element coupled directly to the upper surface of the lid plate and configured to heat the contoured bottom surface of the lid plate by disseminating heat through the lid plate directly to the contoured bottom surface of the lid plate which is configured to be exposed to a reaction zone;

a remote plasma source fluidly coupled to the central channel; and

an isolation collar coupled between the remote plasma source and the housing, wherein the isolation collar has an inner channel extending through the isolation collar to fluidly couple the remote plasma source and the central channel.

2. The chamber lid assembly of claim 1, wherein the first heating element comprises one or more cartridge heaters disposed in the housing; and wherein the second heating element comprises a heater plate coupled to ~~an~~ the upper surface of the lid plate.

~~3. The chamber lid assembly of claim 1, further comprising:~~

~~a cleaning gas source coupled to the remote plasma source to supply the remote plasma source with a cleaning gas.~~

~~4. The chamber lid assembly of claim 3, wherein the cleaning gas is nitrogen trifluoride.~~

~~5. The chamber lid assembly of claim 1, wherein the isolation collar is formed of aluminum.~~

~~6~~3. The chamber lid assembly of ~~any of claims 1 to 5:~~ claim 1,
~~wherein the first heating element comprises one or more cartridge heaters disposed in the housing;~~
~~wherein the second heating element comprises a heater plate coupled to an upper surface of the lid plate;~~
wherein the housing includes an inner region and at least partially defines a first annular channel and a second annular channel, ~~and~~ wherein the first and second annular channels are fluidly coupled to the central channel;
and further comprising:

an insert disposed in the inner region and extending to the upper surface of the lid plate, the insert having a central passageway that at least partially defines the central channel, wherein the insert includes a first plurality of apertures and a second plurality of apertures, wherein the first plurality of apertures are disposed along a first horizontal plane to provide a multi-aperture ~~gas~~ inlet between the first annular channel and the central channel, wherein the second plurality of apertures are disposed along a second horizontal plane to provide a multi-aperture ~~gas~~ inlet between the second annular channel and the central channel~~; and~~

~~a thermal isolation ring disposed between the isolation collar and the insert to minimize a contact area between the isolation collar and the insert~~.

~~7. The chamber lid assembly of any of claims 1 to 5, wherein the housing includes an inner region and at least partially defines a first annular channel and a second annular channel, wherein the first and second annular channels are fluidly coupled to the central channel; and further comprising:~~

~~an insert disposed in the inner region and having a central passageway that at least partially defines the central channel, wherein the insert includes a first plurality of apertures and a second plurality of apertures, wherein the first plurality of apertures are disposed along a first horizontal plane to provide a multi-aperture gas inlet between the first annular channel and the central channel, wherein the second plurality of apertures are disposed along a second horizontal plane to provide a multi-aperture gas inlet between the second annular channel and the central channel.~~

~~8~~4. The chamber lid assembly of claim ~~7~~3, wherein each aperture of the first plurality of apertures is angled with respect to the central axis so as to induce a flow of a gas about the central axis in a first rotational direction, and

wherein each aperture of the second plurality of apertures is angled with respect to the central axis so as to induce a flow of a gas about the central axis in a second rotational direction opposite the first rotational direction.

~~9~~5. The chamber lid assembly of claim ~~7~~3, further comprising:

a thermal isolation ring disposed between the isolation collar and the insert to minimize a contact area between the isolation collar and the insert.

~~10~~6. The chamber lid assembly of claim ~~9~~5, wherein the thermal isolation ring is formed of stainless steel.

~~11~~7. The chamber lid assembly of claim ~~7~~3, wherein the insert is monolithic and includes a cap disposed at an upper portion of the insert that covers a top surface of the housing, and wherein the cap includes a plurality of holes formed in a central portion of the cap, the plurality of holes fluidly coupling the inner channel of the isolation collar and the central channel.

~~12~~8. The chamber lid assembly of claim ~~7~~3, wherein the first plurality of apertures and the second plurality of apertures each include radial apertures and tangential apertures.

9. The chamber lid assembly of claim 1, further comprising:

a cleaning gas source coupled to the remote plasma source to supply the remote plasma source with a cleaning gas.

10. The chamber lid assembly of claim 9, wherein the cleaning gas is nitrogen trifluoride.

11. The chamber lid assembly of claim 1, wherein the isolation collar is formed of aluminum.

12. The chamber lid assembly of claim 1:

wherein the first heating element comprises one or more cartridge heaters disposed in the housing;

wherein the second heating element comprises a heater plate coupled to an upper surface of the lid plate;

wherein the housing includes an inner region and at least partially defines a first annular channel and a second annular channel, and wherein the first and second annular channels are fluidly coupled to the central channel;

and further comprising:

an insert disposed in the inner region and extending to the upper surface of the lid plate, the insert having a central passageway that at least partially defines the central channel, wherein the insert includes a first plurality of apertures and a second plurality of apertures, wherein the first plurality of apertures are disposed along a first horizontal plane to provide a multi-aperture inlet between the first annular channel and the central channel, wherein the second plurality of apertures are disposed along a second horizontal plane to provide a multi-aperture inlet between the second annular channel and the central channel; and

a thermal isolation ring disposed between the isolation collar and the insert to minimize a contact area between the isolation collar and the insert.

13. A substrate processing chamber, comprising:

a chamber body; and

a chamber lid assembly coupled to the chamber body to define a processing volume within the chamber body and beneath the chamber lid assembly, wherein the chamber lid assembly comprises:

a housing enclosing a central channel that extends along a central axis and has an upper portion and a lower portion;

a lid plate with an upper surface comprising a planar exterior wall of the substrate processing chamber coupled directly to a lower surface of the housing and having a contoured bottom surface that extends downwardly and outwardly from a central opening coupled to the lower portion of the central channel to a peripheral portion of the lid plate, wherein a first portion of the contoured bottom surface where the contoured bottom surface meets the central channel is conical and has a first angle with respect to the central axis, wherein a second portion of the contoured bottom surface radially outward of the first portion is also conical and has a second angle with respect to the central axis, and wherein the second angle is different than the first angle;

a first heating element to heat the central channel;

a second heating element coupled directly to the upper surface of the lid plate and configured to heat the contoured bottom surface of the lid plate by disseminating heat through the lid plate directly to the contoured bottom surface of the lid plate which is configured to be exposed to a reaction zone;

a remote plasma source fluidly coupled to the central channel; and

an isolation collar coupled between the remote plasma source and the housing, wherein the isolation collar has an inner channel extending through the isolation collar to fluidly couple the remote plasma source and the central channel.

14. The substrate processing chamber of claim 13, wherein the first heating element comprises one or more cartridge heaters disposed in the housing; and wherein the second heating element comprises a heater plate coupled to the upper surface of the lid plate.

15. The substrate processing chamber of claim 13, wherein the housing includes an inner region and at least partially defines a first annular channel and a second annular channel, wherein the first and second annular channels are fluidly coupled to the central channel; and further comprising:

an insert disposed in the inner region and extending to the upper surface of the lid plate, the insert having a central passageway that at least partially defines the central channel, wherein the insert includes a first plurality of apertures and a second plurality of apertures, wherein the first plurality of apertures are disposed along a first horizontal plane to provide a multi-aperture inlet between the first annular channel and the central channel, wherein the second plurality of apertures are disposed along a second horizontal plane to provide a multi-aperture inlet between the second annular channel and the central channel.

16. The substrate processing chamber of claim 15, wherein each aperture of the first plurality of apertures is angled with respect to the central axis so as to induce a flow of a gas about the central axis in a first rotational direction, and

wherein each aperture of the second plurality of apertures is angled with respect to the central axis so as to induce a flow of a gas about the central axis in a second rotational direction opposite the first rotational direction.

17. The substrate processing chamber of claim 15, wherein the chamber lid assembly further comprises:

a thermal isolation ring disposed between the isolation collar and the insert to minimize a contact area between the isolation collar and the insert.

18. The substrate processing chamber of claim 15, wherein the insert is monolithic and includes a cap disposed at an upper portion of the insert that covers a top surface of the housing, and wherein the cap includes a plurality of holes formed in a central portion of the cap, the plurality of holes fluidly coupling the inner channel of the isolation collar and the central channel of the chamber lid assembly.

~~13. A method of cleaning a process chamber, comprising:~~

~~providing a cleaning gas to a remote plasma source;~~

~~forming a plasma from the cleaning gas;~~

~~flowing the plasma from the remote plasma source through an isolation collar and into a central channel and a reaction zone of a chamber lid assembly to vaporize byproducts on walls of the chamber lid assembly; and~~

~~heating the chamber lid assembly to a predetermined temperature while the plasma is flowed into the central channel and the reaction zone.~~

~~14. The method of claim 13, wherein the predetermined temperature is greater than or equal to 150 °C.~~

~~15. The method of any of claims 13 to 14, wherein the cleaning gas is nitrogen trifluoride.~~