What is claimed is:

1. A processing chamber comprising:

a target backing plate in a top portion of the processing chamber;

a substrate support in a bottom portion of the processing chamber, the substrate support having a support surface spaced a distance from the target backing plate to form a process cavity;

a deposition ring positioned at an outer periphery of the substrate support, the deposition ring having an outer portion with a contoured shape; and

a shield forming an outer bound of the process cavity, the shield having a top shield end in the top portion of the processing chamber and a bottom shield end in the bottom portion of the processing chamber, the top end positioned around a periphery of the target backing plate and the bottom end positioned around a periphery of the substrate support, the bottom end including a contoured surface having a complementary shape to the outer portion of the deposition ring,

wherein the top portion of the processing chamber comprises a top gas flow path between a periphery of the target backing plate and the top of the shield,

the bottom portion of the processing chamber comprises a bottom gas flow path between the shield and the deposition ring

a sealing bracket positioned on an opposite side of the substrate support from the target backing plate so that the deposition ring is between the target backing plate and the sealing bracket; and

a bellows assembly connected to the shield,

wherein the deposition ring and sealing bracket movable between a process position where there is a gap between the sealing bracket and the deposition ring and a cleaning position where the sealing bracket contacts the bellows assembly.

2. The processing chamber of claim 1 further comprising a shutter disk positioned below the shield, wherein the substrate support and the shutter disk are movable

between a process position where the shutter disk moves out horizontally for the substrate support to move up and form the process cavity and a cleaning position where the substrate support moves down for the shutter disk to disconnect a fluid connection between the substrate support and the process cavity.

3. The processing chamber of claim 1, further comprising a turbo pump housing in fluid communication with the process cavity through the bottom flow path when in the process position and isolated from the process region via the bottom flow path when in the cleaning position.

4. The processing chamber of claim 1, further comprising a roughing pump in fluid communication with the process region through the top flow path.

5. The processing chamber of claim 4, further comprising a roughing valve between the roughing pump and the process cavity, the roughing valve configured to allow a flow of gas from the process cavity to the roughing pump through the top flow path when the roughing valve is opened and to prevent flow to the roughing pump when the roughing valve is closed.

6. The processing chamber of claim 5, wherein the processing chamber is configured to allow a flow of gas into the process region through the top flow path when the roughing valve is closed.

7. The processing chamber of claim 6, wherein the roughing valve is closed when the deposition ring and sealing bracket are in the cleaning position.

8. The processing chamber of claim 4, wherein one or more of the shield, the target backing plate, the substrate support, the deposition ring, the sealing bracket, or the turbo pump housing is resistant to fluoride radical and/or fluorine sputtering.

9. An in-chamber cleaning method comprising:

closing a bottom gas flow path of a processing chamber to a process cavity, the process cavity is defined by a substrate support, a target backing plate and a shield, when the processing chamber is in a process position;

flowing an inert gas from an inert gas inlet into a chamber, the chamber is defined by the substrate support, a grounding bracket, the shield, an adapter and a chamber body;

flowing a reactant from a reactant inlet into the process cavity of through an opening in the shield; and

evacuating the reactant from the process cavity through a top gas flow path, the top gas flow path located within a top portion of the processing chamber, the top gas flow path passing over the shield.

10. The method of claim 9, wherein closing the bottom gas flow path is performed by moving a sealing bracket to contact a bellows assembly, wherein the sealing bracket positioned on an opposite side of the substrate support from the target backing plate so that the deposition ring is between the target backing plate and the sealing bracket, and a bellows assembly connected to the shield.

11. The method of claim 9, wherein closing the bottom gas flow path comprises:

moving the substrate support into the chamber; and

sliding a shutter disk into the process cavity from below the shield to disconnect the chamber from the process cavity.

12. The method of claim 9, wherein the reactant comprises NF_3, fluoride radical, hydrogen (H_2), oxygen (O_2) or combination thereof.

13. The method of claim 9, wherein one or more of the target is maintained at a temperature in a range of from 40 °C to 65 °C, the substrate support is maintained at a temperature in a range of from 200 °C to 250 °C, or the shield is maintained at a temperature in a range of from 200 °C to 250 °C.

14. The method of claim 12, wherein the fluoride radical is formed by applying RF bias to the pedestal.

15. The method of claim 12, wherein 1 liter of NF_3 is flown into the process cavity.

16. The method of claim 9, wherein the method is performed by one or more of flowing the reactant at a pressure in a range of from 100 mTorr to 1Torr in the process cavity or flowing the inert gas into the chamber at a pressure in a range of from 2 Torr to 3 Torr.

17. The method of claim 9, wherein the reactant comprises fluoride radical, the fluoride radical is generated from NF_3 in a remote plasma source.

18. The method of claim 9 further comprises coating one or more of the substrate support, the shield, the deposition ring, the sealing bracket, the bellows assembly or the target backing plate with a coating material, the coating material is selected from a group consisting of YF, YOF, AlOF, ZrO_2F, ZrO_2, AlO_x or Y_2O_3.

19. The method of claim 9 removes a built-up material, the built-up material comprises SiN or a derivative thereof.