Claims:

1. An apparatus for processing a substrate, comprising:

a substrate support;

one or more electrodes coupled to the substrate support;

a showerhead assembly having a face plate opposing the substrate support; and

one or more ground elements spaced radially away from the substrate support, wherein the substrate support and the face plate cooperatively define a processing volume and the one or more electrodes are adapted to generate a tunable electric field inside the processing volume having axial and radial components.

2. The apparatus of claim 1, wherein the one or more electrodes is disposed within the substrate support.

3. The apparatus of claim 1, wherein a portion of at least one of the one or more electrodes is angled.

4. The apparatus of claim 1, further comprising one or more tunable circuits coupled to at least one of the one or more ground planes.

5. The apparatus of claim 4, further comprising one or more tunable circuits coupled to at least one of the one or more electrodes.

6. The apparatus of claim 1, wherein the face plate is divided into zones separated by one or more isolators.

7. The apparatus of claim 6, further comprising isolators disposed between the one or more ground planes.

8. An apparatus for supporting a substrate in a processing chamber, comprising:

a support surface;

a thermal control element disposed within the support surface;

an electrode disposed within the support surface, wherein the electrode has a first portion defining a first plane and a second portion defining an angled surface, and the angled surface intersects the first plane; and

a tuner coupled to the electrode.

9. The apparatus of claim 8, further comprising an electronic filter coupled to the electrode.

10. The apparatus of claim 8, wherein the support surface defines a second plane, and the first plane is substantially parallel to the second plane.

11. The apparatus of claim 8, wherein the electrode is an RF mesh.

12. A method of controlling the spatial distribution of a capacitively coupled plasma, comprising:

positioning a first electrode inside a processing chamber;

positioning a first ground plane inside the processing chamber and facing the first electrode to define a processing volume; and

generating an electric field with axial and radial components inside the processing volume by application of RF power to the first electrode and DC power to the first ground plane.

13. The method of claim 12, further comprising positioning a second ground plane inside the processing chamber.

14. The method of claim 12, further comprising using the first ground plane to provide a path to ground for the RF power and to apply a voltage bias inside the processing volume.

CLAIMS

1. An apparatus for processing a substrate, comprising:

a chamber comprising a chamber body, wherein the chamber body comprises a sidewall;

a substrate support disposed within the chamber;

one or more electrodes coupled to the substrate support;

a showerhead assembly having a face plate opposing the substrate support, wherein the substrate support and the face plate cooperatively define a processing volume;

a pumping channel formed in the sidewall and coupled to the processing volume by an exhaust port; and

one or more ground elements embedded in the side-wall, wherein the one or more electrodes are adapted to generate a tunable electric field inside the processing volume having axial and radial components.

2. The apparatus of claim 1, wherein the one or more electrodes is disposed within the substrate support.

3. The apparatus of claim 1, wherein a portion of at least one of the one or more electrodes is angled.

4. The apparatus of claim 1, further comprising one or more tunable circuits coupled to at least one of the one. or more ground elements.

5. The apparatus of claim 4, further comprising one or more tunable circuits coupled to at least one of the one or more electrodes.

6. The apparatus of claim 1, wherein the face plate is divided into zones separated by one or more isolators.

7. The apparatus of claim 6, further comprising isolators disposed between the one or more ground elements.

8. An apparatus for supporting a substrate in a processing chamber, comprising:

a chamber comprising a chamber body with a sidewall;

a support surface disposed within the chamber;

a thermal control element disposed within the support surface;

an electrode disposed within the support surface, wherein the electrode has a first portion defining a first plane and a second portion defining an angled surface, and the angled surface intersects the first plane;

a second electrode embedded within the sidewall;

a pumping channel formed in the sidewall and coupled to an exhaust port; and

a tuner coupled to the electrode.

9. The apparatus of claim 8, further comprising an electronic tilter coupled to the electrode.

10. The apparatus of claim 8, wherein the electrode is an RF mesh.