A MULTI-PERIPHERAL RING ARRANGEMENT FOR PERFORMING PLASMA CONFINEMENT

BACKGROUND OF THE INVENTION

[Para 1] Advances in plasma processing have provided for the growth in the semiconductor industry. With the utilization of a plasma processing system, substrates may be transformed into a variety of devices, such as a micro electro-mechanical system (MEMS) device. To gain a competitive advantage, a manufacturing company needs to be able to maintain tight control of the process parameters in order to minimize waste and produce high quality semiconductor devices.

[Para 2] To facilitate discussion, Fig. 1 shows a simple diagram of a partial view of a processing chamber 100 with a peripheral ring arrangement. Consider the situation wherein, for example, a substrate 106 is being processed within processing chamber 100. Substrate 106 may be positioned above a bottom electrode 104. Within processing chamber 100, gas may interact with radio frequency (RF) current to form plasma 108 between substrate 106 and an upper electrode 102 during substrate processing. RF current may be flowing from an RF source 122 through a cable 120 and a RF match 120 to enter processing chamber 100.

[Para 3] In order to control plasma formation and to protect the process chamber walls, plasma 108 may be confined to a limited chamber volume 110, such as the region surrounded by a peripheral ring 112. In addition to peripheral ring 112, the periphery of confined chamber volume 110 may also be defined by upper electrode 102, bottom electrode 104, an edge ring 114, insulator rings 116 and 118, and a chamber support structure 128.

[Para 4] In order to exhaust the gas (such as the neutral species of the gas) from the confinement region (confined chamber volume 110), peripheral ring 112 may include a plurality of slots (such as slots 126a, 126b, and 126c). Each slot has a fixed geometry and is configured to be large enough to allow the processed byproduct gas (such as neutral gas species) to exit confined chamber volume 110. In other words, the processed byproduct gas (such as neutral gas species) may traverse from confined chamber volume 110 through the slots into an external region 132 (outside chamber volume) of processing chamber 100 before being pumped out of processing chamber 100 via a turbo pump 134.

[Para 5] Since the slots provide a direct line-of-sight from within confined chamber volume 110 and external region 132 of processing chamber 100, the RF current may leak through and establish a presence in external region 132 of processing chamber 100. Under certain conditions, the presence of a RF field may cause the processed byproduct gas (such as

neutral gas species) (which has been exhausted from confined chamber volume 110 into external region 132 of processing chamber 100) to react and ignite a plasma 142 in the outside chamber volume.

[Para 6] The possibility of a plasma forming environment in external region 132 of processing chamber 100 is highly likely if a high pressure volume/level exists within processing chamber 100. In an example, during substrate processing, the pressure volume/level may have fallen below an acceptable threshold range (such as that established by a recipe step). To increase the pressure volume/level within confined chamber volume 110, a vacuum valve 138 may be tightened. Unfortunately, the adjustment of vacuum valve 138 may not only increase the pressure volume/level within confined chamber volume 110 but also may increase the pressure volume/level in external region 132 of processing chamber 100. Thus, in this type of environment (such as a high-pressurized environment), the presence of a RF field may cause the processed byproduct gas (such as neutral gas species) to react and ignite plasma 142 in a region outside of confined chamber volume 110.

[Para 7] Accordingly, an arrangement for performing plasma confinement is desirable.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[Para 8] The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

[Para 9] Fig. 1 shows a simple diagram of a partial view of a processing chamber 100 with a peripheral ring arrangement.

[Para 10] Figs. 2A, 2B, 2C, and 2D show, in embodiments of the invention, simple diagrams illustrating a multi-peripheral ring arrangement for performing plasma confinement within a processing chamber.

[Para 11] Fig. 3 shows, in an embodiment of the invention, a processing chamber environment with a multi-peripheral ring arrangement with a conductive control ring for performing pressure control and plasma confinement.

DETAILED DESCRIPTION OF EMBODIMENTS

[Para 12] The present invention will now be described in detail with reference to a few embodiments thereof as illustrated in the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be apparent, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In

other instances, well known process steps and/or structures have not been described in detail in order to not unnecessarily obscure the present invention.

[Para 13] Various embodiments are described hereinbelow, including methods and techniques. It should be kept in mind that the invention might also cover articles of manufacture that includes a computer readable medium on which computer-readable instructions for carrying out embodiments of the inventive technique are stored. The computer readable medium may include, for example, semiconductor, magnetic, opto-magnetic, optical, or other forms of computer readable medium for storing computer readable code. Further, the invention may also cover apparatuses for practicing embodiments of the invention. Such apparatus may include circuits, dedicated and/or programmable, to carry out tasks pertaining to embodiments of the invention. Examples of such apparatus include a general-purpose computer and/or a dedicated computing device when appropriately programmed and may include a combination of a computer/computing device and dedicated/programmable circuits adapted for the various tasks pertaining to embodiments of the invention.

[Para 14] As aforementioned in the background section, the RF current (RF field) may leak out of the confinement region (region surrounded by the peripheral ring). Given the right pressure environment, the RF current may ignite the processed byproduct gas (such as neutral gas species) to form unconfined plasma (i.e., plasma outside of the confinement region). Since unconfined plasma may narrow the process window and may also damage the processing chamber wall, an arrangement is needed to minimize the possibility of RF field leakage.

[Para 15] In one aspect of the invention, the inventors herein realized that by removing the direct line-of-sight from the confinement region to the outside chamber volume, RF field leakage may be substantially eliminated. In accordance with embodiments of the present invention, an arrangement for plasma confinement is provided. Embodiments of the invention include a multi-peripheral ring arrangement for managing the RF field.

[Para 16] In an embodiment of the invention, a multi-peripheral ring arrangement is provided for performing plasma confinement within a processing chamber of a plasma processing system. In an embodiment, the multi-peripheral ring arrangement may be implemented within a capacitively-coupled plasma (CCP) processing system.

[Para 17] In an embodiment of the invention, the multi-peripheral ring arrangement may include a first peripheral ring next to a second peripheral ring. As discussed herein, the term "next to" may refer to but are not limited to the rings having a nesting arrangement (such as

the rings being nested inside and out, the rings being nested within one another), being stacked on top of one another, being adjacent to one another, being separated by a small gap, and the like. In a preferred embodiment, the multi-peripheral ring arrangement may include a first peripheral ring stacked on top of a second peripheral ring. The first peripheral ring may be made of a dielectric material or a semi-conductor material. Similarly, the second peripheral ring may be made from a dielectric material. The second peripheral ring may also be made from a conductive material such as stainless steel.

[Para 18] Each peripheral ring may have a plurality of slots, which may be employed to exhaust the processed byproduct gas (such as neutral gas species) from the confinement region. As discussed herein, the term "processed byproduct gas" refers to any gas species that is a byproduct of the processing and need to be exhausted. In an embodiment, each slot has a radial geometry. However, the slots are not limited to a radial shape and may have other configurations, including a peripheral geometry.

[Para 19] In one embodiment, the number/shape/size of the slots may have the same geometry and dimension on both peripheral rings. In another embodiment, the number/shape/size of the slots on the first peripheral ring may differ from the slots on the secondary peripheral ring. In an example, the shape of the slots on the primary peripheral ring may have a radial geometry while the slots of the secondary ring may have a peripheral geometry. Additionally or alternatively, the slot size may differ between the two peripheral rings. In an example, the slot size of the primary peripheral ring may be larger than the slot size of the secondary peripheral ring. Likewise, the slot size of the secondary peripheral ring may be larger than the slot size of the primary peripheral ring. Regardless, the slots of the secondary peripheral ring are offset away from the slots of the primary peripheral ring to prevent a direct line-of-sight from the confinement region to the outside chamber volume, in an embodiment. Without a direct line-of-sight, the RF current is substantially blocked from escaping the confinement region. Accordingly, without the presence of an RF field in the external region of the processing chamber, conditions in the outside chamber volume are usually not capable of supporting plasma formation.

[Para 20] Fig. 2A shows, in an embodiment of the invention, a simple diagram of a partial view of a processing chamber 200 with a multi-peripheral ring arrangement for performing plasma confinement. Consider the situation wherein, for example, a substrate 206 is being processed within processing chamber 200. In an embodiment, processing chamber 200 may be a capacitively-coupled plasma processing chamber. Substrate 206 may be positioned above a bottom electrode 204. During substrate processing, a plasma 208,

which may be employed to etch substrate 206, may form between substrate 206 and an upper electrode 202.

[Para 21] In order to control plasma formation and to protect the processing chamber walls, a primary peripheral ring 212 may be employed. Primary peripheral ring 212 may be made from a dielectric material or a semi-conductor material. Usually, primary peripheral ring 212 may be configured to surround the periphery of a confined chamber volume 210 in which plasma 208 is to form. In addition to peripheral ring 212, the periphery of confined chamber volume 210 may also be defined by upper electrode 202, bottom electrode 204, an edge ring 214, insulator rings 216 and 218, and chamber support structure 228.

[Para 22] During substrate processing, gas may flow from a gas distribution system (not shown) into confined chamber volume 210 and interact with RF current to create plasma 208. RF current may be flowing from an RF source 222 through a cable 224 to a RF match 220. From RF match 224, the RF current may flow through bottom electrode 204 and be available within confined chamber volume 210 for plasma formation. Those skilled in the art are aware that some of the chamber components (such as the upper electrode, the bottom electrode, the insulator rings, the edge ring, the chamber support structure, and the like) may have other configurations than that shown. Also, the number of RF sources and RF matches may also vary depending upon the plasma processing system.

[Para 23] In order to exhaust the processed byproduct gas (such as neutral gas species) from the confinement region (confined chamber volume 210), primary peripheral ring 212 may include a plurality of slots (such as slots 226a, 226b, 226c, and 226d). The processed byproduct gas (such as neutral gas species) may traverse from confined chamber volume 210 into an external region 232 (outside chamber volume) of processing chamber 200 before being pumped out of processing chamber 200 via a turbo pump 234.

[Para 24] The slots on primary peripheral ring 212 may have a radial shape, although other configurations may be employed. Each slot has a fixed geometry and is configured to be sufficiently large to allow the processed byproduct gas (such as neutral gas species) to exit confined chamber volume 210. As aforementioned, each slot usually has a cross-sectional of less than two times the plasma sheath (not shown).

[Para 25] Regardless of the size of the slots, each slot tends to have a straight opening, thereby providing a direct line-of-sight between confined chamber volume 210 and external region 232 (outside chamber volume) of processing chamber 200. As a result, the electrons of the RF field are able to traverse through the openings provided by the slots and leak into external region 232 of processing chamber 200. Given certain conditions (such as a high-

pressurized environment), the presence of an RF field in the outside chamber volume may cause the processed byproduct gas (such as neutral gas species) to ignite and form plasma in external region 232. Thus, plasma unconfinement may result.

[Para 26] In an embodiment, a multi-peripheral ring arrangement is provided to prevent plasma unconfinement. The multi-peripheral ring arrangement may include a secondary peripheral ring 270 surrounding primary peripheral ring 212. A manifold 284 may exist between primary peripheral ring 212 and secondary peripheral ring 270 to create a route for the processed byproduct gas (such as neutral gas species) to be exhausted.

[Para 27] Secondary peripheral ring 270 may be made from a dielectric material, in an embodiment. In another embodiment, secondary peripheral ring 270 may be made from a conductive material such as steel, for example.

[Para 28] The dimension of second peripheral ring 270 may vary, in an embodiment. In an example, both peripheral rings may have the same dimension. In another example, secondary peripheral ring 270 may have a larger dimension than primary peripheral ring 212. Although in one embodiment, secondary peripheral ring 270 may have a smaller dimension than primary peripheral ring 212; however, the dimension of secondary peripheral ring 270 is preferably configured to be sufficiently large to prevent the RF current from escaping into the outside chamber volume.

[Para 29] Secondary peripheral ring 270 may include a plurality of slots (such as slots 276a, 276b, 276c, 276d, and 276e). The shape of the slots on secondary peripheral ring 270 may vary, including but are not limited to a radial geometry and a peripheral shape. In an embodiment, the slots of secondary peripheral ring 270 and primary peripheral ring 212 may have the same geometry. However, the multi-peripheral ring arrangement may also provide for peripheral rings with different slot shapes. Regardless of the geometric design of the slots on both peripheral rings, the slots are configured to be large enough to enable the processed byproduct gas (e.g., neutral gas species) to be exhausted from confined chamber volume 210 while preventing the formation of plasma in the outside chamber volume. In an example, each slot may be smaller than twice the size of a plasma sheath.

[Para 30] Although Fig. 2A and 2B show secondary peripheral ring 270 as having more slots than primary peripheral ring 270, other configurations may exist. In one embodiment, primary peripheral ring 212 may have the same number of slots as secondary peripheral ring 270. In another embodiment, primary peripheral ring 212 may have fewer slots than secondary peripheral ring 270. The number of slots on secondary peripheral ring 270 in comparison to primary peripheral ring 212 may depend upon a manufacturer's preference.

[Para 31] In an embodiment, secondary peripheral ring 270 is positioned at a fixed location relative to primary peripheral ring 212, and the wall of secondary peripheral ring 270 is configured to block the flow of RF current. Accordingly, the slots (such as slots 276a, 276b, 276c, 276d, and 276e) of secondary peripheral ring 270 are offset relative to the slots (226a, 226b, 226c, and 226d) of primary peripheral ring 212 (such as shown in Fig. 2B).

[Para 32] In other words, if the electrons from the RF field traverse through slot 226a of primary peripheral ring 212 in a direction 280 (of Fig. 2C), the electrons may travel through manifold 284 to encounter a section of wall 282 instead of one of the slots (such as slots 276a, 276b, 276c, 276d, and 276e) on secondary peripheral ring 270. Thus, a direct line-of-sight from confined chamber volume 210 to external region 232 of processing chamber is substantially eliminated with the multi-peripheral ring arrangement. Instead, the electrons of the RF field may be deflected back into confined chamber volume 210.

[Para 33] In an embodiment, a small level of DC bias (from negative 10 to positive 100, for example) or a low frequency RF current may be applied to secondary peripheral ring 270 to create a charge on wall 282. The built-up charge on wall 282 may help deflect the electrons back into confined chamber volume 210. Thus, even if the pressure environment in external region 232 is conducive for igniting plasma (such as a high-pressurized environment), the absence of an RF field substantially eliminates the possibility of plasma ignition outside of confined chamber volume 210.

[Para 34] Although the slots are shown as being located only at the bottom of each of the peripheral rings (212 and 270), other configurations may exist. Each section (250, 252, and 254) may be employed to exhaust the processed byproduct gas, such as processed byproduct gas, such as neutral gas species (as shown in Fig. 2D). The number of sections that may be employed may depend upon the rate of conductance required. For example, in a chamber that has a normal rate of conductance, slots may be positioned in only one section. However, for a processing chamber that requires a higher rate of exhaust, two or more sections may be employed. Accordingly, the multi-peripheral ring arrangement may be extended into the sections that are employed for exhausting the processed byproduct gas (such as neutral gas species).

[Para 35] Fig. 3 shows, in an embodiment of the invention, a simple diagram of a partial view of a processing chamber environment with a multi-peripheral ring arrangement with a conductive control ring. The discussion about the conductive control ring as a pressure control and plasma confinement arrangement is discussed in Application Docket Number

P1990P/LMRX-P185P1 entitled "A Local Plasma Confinement and Pressure Control Arrangement and Methods Thereof", which is incorporated herein by reference.

[Para 36] Consider the situation wherein, for example, the pressure volume/level within a confined chamber volume 310 is below an acceptable threshold value. In the prior art, to perform pressure control, a vacuum valve may be employed. However, pressure control using a vacuum valve does not provide for localized control. Instead, not only does the pressure volume/level change within confined chamber volume 310, but the pressure environment in external region 332 (outside chamber volume) of a processing chamber 300 is also affected. Thus, if the RF current is able to leak out from confined chamber volume 310, the RF current may interact with the processed byproduct gas (such as neutral gas species) to ignite an unconfined plasma.

[Para 37] In an embodiment of the invention, a conductive control ring 320 is employed to provide local pressure control. Conductive control ring 320 may be made from a dielectric material and may be positioned next to the multi-peripheral ring arrangement, which includes a primary peripheral ring 312 and a secondary peripheral ring 314, in this example. In a preferred embodiment, the conductive control ring surrounds at least one of the peripheral rings. In other words, the conductive control ring is positioned closer to the outside chamber volume, thereby providing a barrier against the possibility of plasma unconfinement.

[Para 38] In an embodiment, the number of slots and the positioning of the slots on conductive control ring 320 may vary. For example, the number of slots and the positioning of the slots on conductive control ring 320 may match the number of slots and the positioning of the slots on secondary peripheral ring 314. In another example, the number of slots and/or positioning of the slots on conductive control ring 320 may differ from that of secondary peripheral ring 314. By actuating/rotating conductive control ring 320, the degrees of offsets between the slots of conductive control ring 320 and the slots of secondary peripheral ring 314 may be manipulated to provide localized pressure control.

[Para 39] In an embodiment, the degrees of offsets may range from a zero offset to a full offset. As discussed herein, zero offset refers to a situation in which at least a first slot on the secondary peripheral ring matches with a first slot on the conductive control ring to provide an unblock passage for the exhausting gas. As discussed herein, a full offset may refers to a situation in which at least one slot on the secondary peripheral ring is covered by a slot on the conductive control ring such that the passage for exhausting gas is blocked. As can be appreciated from the foregoing, the offset relationship between the secondary peripheral ring

and the conductive control ring may also include a partial offset such that at least a portion of the passage for exhausting gas is available.

[Para 40] In the prior art, the high-pressurized environment within a confined chamber volume may also cause the size of the plasma sheath to shrink and enable the plasma to escape the confined chamber volume. Since the change in the pressure volume/level is not localized within the confined chamber volume, the outside chamber volume may now have an environment that is conducive for sustaining the unconfined plasma.

[Para 41] In an embodiment, conductive control ring 320 may surround the multi-peripheral ring arrangement to substantially prevent the plasma from flowing into external region 332 (outside chamber volume) of processing chamber 300. By manipulating conductive control ring 320, the opening of each slot on secondary peripheral ring 314 may be altered. In an example, to increase the pressure level/volume within confined chamber volume 310, conductive control ring 320 may be actuate/rotated to cause the slots on conductive control ring 314 to overlap a portion of the slots on secondary peripheral ring 314. Accordingly, instead of a plurality of fixed-sized slots available for exhausting the processed byproduct gas (such as neutral gas species), the actuation/rotation of conductive control ring 320 has transformed the fixed-sized slots into a plurality of variable-sized slots.

[Para 42] In an embodiment, conductive control ring 320 is moved by a motor (not shown). The motor may be part of an automatic feedback arrangement. The automatic feedback arrangement also include a control module (not shown) configured for providing instructions to the motor when conductive control ring 320 is to be adjusted, in an embodiment. In an example, the pressure volume/level within confined chamber volume 310 has fallen outside an acceptable threshold value. Based on data from a sensor (not shown), the control module may calculate a new position for conductive control ring 320. Thus, conductive control ring 320 may be adjusted automatically without human intervention.

[Para 43] In an embodiment, the shape of the conductive control ring may vary. In an example, if the processing chamber has a normal rate of conductance, then the multi-peripheral ring arrangement may have a configuration in which only one section (350, 352, and 354) have slots for exhausting the processed byproduct gas (such as neutral gas species). Accordingly, conductive control ring 320 may be configured to have corresponding slots in the same section. However, if a higher rate of conductance is required, then two or more sections of the multi-peripheral ring arrangement may have slots to exhaust the processed byproduct gas (such as neutral gas species). Similarly, conductive control ring 320 may be configured accordingly to support multi-peripheral ring arrangement.

[Para 44] As can be appreciated from the forgoing, one or more embodiments of the present invention provide for a multi-peripheral ring arrangement. By providing a secondary peripheral ring, the direct line-of-sight provided by the slots of the primary peripheral ring is substantially eliminated. Without a direct line-of-sight, the RF field is substantially prevented from leaking into the outside chamber volume. Thus, plasma unconfinement is substantially eliminated and a wider processing window may be available for substrate processing.

[Para 45] While this invention has been described in terms of several preferred embodiments, there are alterations, permutations, and equivalents, which fall within the scope of this invention. Although various examples are provided herein, it is intended that these examples be illustrative and not limiting with respect to the invention. In addition, even though the invention is described in relation to a capacitively-coupled plasma (CCP) processing system, the invention may also be applied in relation to an inductively-coupled plasma processing system or a hybrid plasma processing system.

[Para 46] Also, the title and summary are provided herein for convenience and should not be used to construe the scope of the claims herein. Further, the abstract is written in a highly abbreviated form and is provided herein for convenience and thus should not be employed to construe or limit the overall invention, which is expressed in the claims. If the term "set" is employed herein, such term is intended to have its commonly understood mathematical meaning to cover zero, one, or more than one member. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.

CLAIMS

What is claimed is:

1. An arrangement for performing plasma confinement within a processing chamber of a plasma processing system during processing of a substrate, comprising:

a first peripheral ring configured at least for surrounding a confined chamber volume, wherein said confined chamber volume is configured for sustaining a plasma for etching said substrate during substrate processing, said first peripheral ring including a first plurality of slots, wherein said first plurality of slots is configured at least for exhausting processed byproduct gas from said confined chamber volume during said substrate processing;

a second peripheral ring, wherein said second peripheral ring is positioned next to said first peripheral ring, said second peripheral ring includes a second plurality of slots, wherein a first slot of said second plurality of slots is positioned next to a first slot of said first plurality of slots such that said first slot of said second plurality of slots does not overlap said first slot of said first plurality of slots, thereby preventing a direct line-of-sight from within said confined chamber volume to an outside chamber volume, wherein said outside chamber volume is an area outside of said first peripheral ring; and

a manifold connecting said first peripheral ring to said second peripheral ring, wherein said manifold is configured at least for providing a route for said processed byproduct gas to be exhausted from said confined chamber volume.

2. The arrangement of claim 1 further including a power source coupled to said second peripheral ring, wherein said power source is configured at least to create a charge on said second peripheral ring to deflect electrons from flowing back into said confined chamber volume.

3. The arrangement of claim 2 wherein said power source is a radio frequency power source.

4. The arrangement of claim 2 wherein said power source is a direct current power source.

5. The arrangement of claim 1 wherein said first peripheral ring is made from a material that includes a dielectric material.

6. The arrangement of claim 1 wherein said first peripheral ring is made from a material that includes a semi-conductor material.

7. The arrangement of claim 1 wherein said second peripheral ring is made from a material that includes a dielectric material.

8. The arrangement of claim 1 wherein said first peripheral ring is made from a material that includes a conductive material.

9. The arrangement of claim 1 wherein said plasma processing system is a capactively-coupled plasma processing system.

10. An arrangement for performing pressure control within a processing chamber of a plasma processing system during processing of a substrate, comprising:

a multi-peripheral ring arrangement for performing said plasma confinement, wherein said multi-peripheral ring arrangement includes at least

a first peripheral ring configured at least for surrounding a confined chamber volume, wherein said confined chamber volume is configured for sustaining a plasma for etching said substrate during substrate processing, said first peripheral ring including a first plurality of slots, wherein said first plurality of slots is configured at least for exhausting processed byproduct gas from said confined chamber volume during said substrate processing,

a second peripheral ring, wherein said second peripheral ring is positioned next to said first peripheral ring, said second peripheral ring includes a second plurality of slots, wherein a first slot of said second plurality of slots is positioned next to a first slot of said first plurality of slots such that said first slot of said second plurality of slots does not overlap said first slot of said first plurality of slots, thereby preventing a direct line-of-sight from within said confined chamber volume to an outside chamber volume, wherein said outside chamber volume is an area outside of said first peripheral ring, and

a manifold connecting said first peripheral ring to said second peripheral ring, wherein said manifold is configured at least for providing a route for said processed byproduct gas to be exhausted from said confined chamber volume; and

a conductive control ring, wherein said conductive control ring is positioned next to said multi-peripheral ring arrangement and is configured to include a third plurality of slots, wherein said pressure control is achieved by moving said conductive control ring relative to said multi-peripheral ring arrangement such that a first slot of said second plurality of slots of said multiple ring arrangement is offset relative to a second slot of said third plurality of slots of said conductive control ring, wherein said offset is from a range of zero offset to full offset.

11. The arrangement of claim 10 further including a motor, wherein said motor is configured to move said conductive control ring to perform said pressure control.

12. The arrangement of claim 11 further including a set of sensors configured for collecting processing data about pressure volume within said confined chamber volume.

13. The arrangement of claim 12 further including a control module configured for at least

receiving said processing data from said set of sensors,

analyzing said processing data,

determining a new position for said conductive control ring, and

sending said new position as a set of instructions to said motor.

14. The arrangement of claim 13 wherein said motor is configured to receive said set of instructions and to move said conductive control ring to adjust said pressure volume within said confined chamber volume.

15. The arrangement of claim 14 wherein said conductive control ring is positioned outside of said confined chamber volume, wherein said multi-peripheral ring arrangement is nested inside said conductive control ring such that said conductive control ring surrounds said multi-peripheral ring arrangement.

16. The arrangement of claim 15 wherein said conductive control ring is made from a dielectric material.

17. The arrangement of claim 10 wherein said plasma processing system is a capactively-coupled plasma processing system.

18. The arrangement of claim 10 further including a power source coupled to said second peripheral ring, wherein said power source is configured at least to create a charge on said second peripheral ring to deflect a set of electrons flowing back into said confined chamber volume.

19. The arrangement of claim 18 wherein said power source is a radio frequency power source.

20. The arrangement of claim 18 wherein said power source is a direct current power source.