Claims:

1. An apparatus for processing a workpiece, the apparatus comprising:

a process chamber including an upper electrode and a lower electrode, said lower electrode including a pedestal portion having a top surface configured to support the workpiece during processing; and

a workpiece vertical lift mechanism in said process chamber, said workpiece vertical lift mechanism including a plate disposed between said upper electrode and said lower electrode, said plate including an outer perimeter and a first opening inside the outer perimeter that is dimensioned to receive said pedestal portion,

wherein said plate configured to move vertically relative to said pedestal portion between a first position in which said opening in said plate holds the workpiece in a non-contacting relationship with said pedestal portion and a second position

in which said pedestal portion projects above said plate so as to transfer the workpiece from said opening in said plate to a top surface of said pedestal portion.

2. An apparatus of claim 1 wherein said upper electrode is movable toward said lower electrode, and further comprising:

a plurality of spring-biased pusher blocks mechanically coupled with said upper electrode, said spring-biased pusher blocks adapted to contact said plate, as said upper electrode is moved toward said lower electrode, so as to move said plate from the first position to the second position.

3. An apparatus of claim 2 further comprising:

a base; and

a lid movable relative to said base between an open position in which said lid is separated from said base and a closed position in which said lid is proximate to said base,

wherein said upper electrode is mechanically coupled with said lid, and said spring-biased pusher blocks are adapted to contact said plate, as said lid is moved from the open

position toward the closed position, so as to urge said plate from the first position toward the second position.

4. An apparatus of claim 1 wherein said upper and lower electrodes have parallel confronting surfaces, and said plate is located between said confronting surfaces.

5. An apparatus of claim 1 further comprising:

a dielectric separating ring between said lower electrode and said upper electrode, said dielectric separating ling, said lower electrode and said upper electrode collectively bounding said process chamber, and said plate located peripherally inside said dielectric separating ring.

6. An apparatus of claim 1, wherein said upper electrode is movable toward said lower electrode, and further comprising:

a plurality of spring-biased supports configured to couple said plate with said lower electrode, said spring-biased supports configured to urge said plate away from said lower electrode to provide the first position.

7. An apparatus of claim 6 further comprising:

a base; and

a lid movable relative to said base between an open position in which said lid is separated from said base and a closed position in which said lid is proximate to said base,

wherein said upper electrode is mechanically coupled with said lid, and said spring-

biased supports are adapted to yield as said upper electrode moves toward said lower electrode

so as to permit said plate to move from the first position to the second position.

8. An apparatus of claim 6 wherein said first opening is configured to support the workpiece when said plate is in the first position, and further comprising:

a second member configured to be coupled by said spring-biased supports with said lower electrode as a replacement for said plate, said second member including a second opening of a different diameter from that of said first opening in said plate.

9. An apparatus of claim 8 wherein said pedestal portion is dimensioned to fit within said first opening, and said pedestal portion is configured to be removed from said process chamber for exchange with another pedestal portion dimensioned to fit within said second opening in said second member.

10. An apparatus of claim l wherein said pedestal portion projects from

said lower electrode toward said upper electrode.

11. An apparatus of claim 1 wherein said plate includes a gap extending from said opening to said outer perimeter.

12. An apparatus of claim 11, further comprising: a stationary member supported by said lower electrode, said stationary member having a fixed position relative to said pedestal portion as said upper electrode moves relative to said lower electrode, and said stationary member at least partially filling said gap when said plate is in the second position.

13. An apparatus of claim 12 wherein said plate has a first surface and said stationary member has a second surface, said first and second surfaces are oriented to face toward said upper electrode and said first and second surfaces are coplanar when said plate is in the second position.

14. An apparatus of claim 13 further comprising:

a layer of a dielectric material on a majority of a surface area on each of said first and second surfaces.

15. An apparatus of claim 1 further comprising:

a flexible perforated ling that encircles a perimeter of the workpiece when the workpiece is disposed on said pedestal portion.

16. A method of processing a workpiece supported on an pedestal portion of a lower electrode in a process chamber of a processing system, the method comprising:

transferring a workpiece to a plate including an outer perimeter and an opening inside the outer perimeter that is dimensioned to receive said pedestal portion, inside the process chamber;

moving the plate vertically toward the pedestal portion of the lower electrode while said opening in said plate holds the workpiece in a non-contacting relationship with said pedestal portion so as to transfer the workpiece from the opening of the plate to the pedestal portion;

generating a plasma inside the process chamber using the lower electrode and an upper electrode; and

processing the workpiece with the plasma while the workpiece is supported on the pedestal portion of the lower electrode.

17. A method of claim 16 wherein the processing system includes the upper electrode which is movable toward said lower electrode, and moving the plate toward the pedestal portion further comprises:

moving the upper electrode toward the lower electrode; and

transferring a force from the upper electrode to the plate, as the upper electrode moves toward the lower electrode, effective to move the plate toward the pedestal portion.

18. A method of claim 17 further comprising:

after processing the workpiece, moving the upper electrode away from the

lower electrode to release the force transferred from the upper electrode to the plate; and resiliently biasing the plate away from the lower electrode, as the force is released, so that the support of the workpiece is transferred from the pedestal portion to the opening in the plate.

19. A method of claim 17 wherein the process chamber includes a base and a lid movable relative to the base between an open position in which the lid is separated from the base and a closed position in winch the lid is proximate to the base, the upper electrode is mounted to the lid, and transferring the support of the workpiece from the opening in the plate to the pedestal portion, the method further comprising:

moving the plate relative to the pedestal portion by contacting the lid, as the lid is moved from the open position toward the closed position, to transfer the support of the workpiece from the opening in the plate to the pedestal portion.

20. A method of claim 17 further comprising:

after processing the workpiece, releasing the force transferred from the upper electrode to the plate; and

resiliently biasing the plate away from the lower electrode, as the force is released, so that the support of the workpiece is transferred from the pedestal portion to the opening in the plate.

21. A method of claim 16 further comprising:

after processing the workpiece, resiliently biasing the plate away from the pedestal portion so that the support of the workpiece is transferred from the pedestal

portion to the opening in the plate.

22. A method of claim 16 wherein transferring the workpiece to the plate further comprises:

supporting the workpiece on an end effector; and

manipulating the end effector to carry the supported workpiece and transfer the support of the workpiece from a position outside of the process chamber to the plate without guiding the workpiece during the transfer.

23. A method of claim 22 further comprising:

after processing the workpiece, manipulating the end effector to remove the workpiece from the plate to the position outside of the process chamber without guiding the workpiece during the transfer.

What is claimed is:

Claims:

1. An apparatus for processing a workpiece, the apparatus comprising:

a process chamber including an upper electrode and a lower electrode, said lower electrode including a pedestal portion configured to support the workpiece during processing; and

a workpiece vertical lift mechanism in said process chamber, said workpiece vertical lift mechanism including a vertically movable member disposed between said upper electrode and said lower electrode, and said vertically movable member configured to move vertically relative to said pedestal portion between a first position in which said vertically movable member holds the workpiece in a non-contacting relationship with said pedestal portion and a second position in which said pedestal portion projects above said vertically movable member so as to transfer the workpiece from said vertically movable member to said pedestal portion.

2. The apparatus of claim 1 wherein said upper electrode is movable toward said lower electrode, and further comprising:

a plurality of spring-biased pusher blocks mechanically coupled with said upper electrode, said spring-biased pusher blocks adapted to contact said vertically movable member, as said upper electrode is moved toward said lower electrode, so as to move said vertically movable member from the first position to the second position.

3. The apparatus of claim 2 further comprising:

a base; and

a lid movable relative to said base between an open position in which said lid is separated from said base and a closed position in which said lid is proximate to said base, wherein said upper electrode is mechanically coupled with said lid, and said spring-biased pusher blocks are adapted to contact said vertically movable member, as said lid is moved from the open position toward the closed position, so as to urge said vertically movable member from the first position toward the second position.

4. The apparatus of claim 1 wherein said upper and lower electrodes have approximately parallel confronting surfaces, and said vertically movable member is located between said confronting surfaces.

5. The apparatus of claim 1 further comprising:

a dielectric separating ring between said lower electrode and said upper electrode, said dielectric separating ring, said lower electrode, and said upper electrode collectively bounding said process chamber, and said vertically movable member located peripherally inside said dielectric separating ring.

6. The apparatus of claim 1 wherein said upper electrode is movable toward said lower electrode, and further comprising:

a plurality of spring-biased supports configured to couple said vertically movable member with said lower electrode, said spring-biased supports configured to urge said vertically movable member away from said lower electrode to provide the first position.

7. The apparatus of claim 6 further comprising:

a base; and

a lid movable relative to said base between an open position in which said lid is separated from said base and a closed position in which said lid is proximate to said base;

wherein said upper electrode is mechanically coupled with said lid, and said spring-biased supports are adapted to yield as said upper electrode moves toward said lower electrode so as to permit said vertically movable member to move from the first position to the second position.

8. The apparatus of claim 6 wherein said vertically movable member includes a first opening configured to support the workpiece when said vertically movable member is in the first position, and further comprising:

a second member configured to be coupled by said spring-biased supports with said lower electrode as a replacement for said vertically movable member, said second member including a second opening of a different diameter than said first opening in said vertically movable member.

9. The apparatus of claim 8 wherein said pedestal portion is dimensioned to fit within said first opening, and said pedestal portion is configured to be removed from said process chamber for exchange with another pedestal portion dimensioned to fit within said second opening in said second member.

10. The apparatus of claim 1 wherein said pedestal portion projects from said lower electrode toward said upper electrode.

11. The apparatus of claim 1 wherein said vertically movable member includes an outer perimeter, an opening inside the outer perimeter that is dimensioned to receive said pedestal portion, and a gap extending from said opening to said outer perimeter.

12. The apparatus of claim 11 further comprising:

a stationary member supported by said lower electrode, said stationary member having a fixed position relative to said pedestal portion as said upper electrode moves relative to said lower electrode, and said stationary member at least partially filling said gap when said vertically movable member is in the second position.

13. The apparatus of claim 12 wherein said vertically movable member has a first surface and said stationary member has a second surface, said first and second surfaces are oriented to face toward said upper electrode, and said first and second surfaces are substantially coplanar when said vertically movable member is in the second position.

14. The apparatus of claim 13 further comprising:

a layer of a dielectric material on a majority of a surface area on each of said first and second surfaces.

15. The apparatus of claim 1 further comprising:

a flexible perforated ring that encircles a perimeter of the workpiece when the workpiece is disposed on said pedestal portion.

16. A method of processing a workpiece supported on an pedestal portion of a lower electrode in a process chamber of a processing system, the method comprising:

transferring a workpiece to a vertically movable member inside the process chamber;

moving the movable member vertically toward the pedestal portion of the lower electrode so as to transfer the workpiece from the movable member to the pedestal portion;

generating a plasma inside the process chamber using the lower electrode and an upper electrode; and

processing the workpiece with the plasma while the workpiece is supported on the pedestal portion of the lower electrode.

17. The method of claim 16 wherein the processing system includes the upper electrode is movable toward said lower electrode, and moving the movable member toward the pedestal portion further comprises:

moving the upper electrode toward the lower electrode; and

transferring a force from the upper electrode to the movable member, as the upper electrode moves toward the lower electrode, effective to move the movable member toward the pedestal portion.

18. The method of claim 17 further comprising:

after processing the workpiece, moving the upper electrode away from the lower electrode so as to release the force transferred from the upper electrode to the movable member; and

resiliently biasing the movable member away from the lower electrode, as the force is released, so that the workpiece is transferred from the pedestal portion to the movable member.

19. The method of claim 17 wherein the process chamber includes a base and a lid movable relative to the base between an open position in which the lid is separated from the base and a closed position in which the lid is proximate to the base, the upper electrode is mounted to the lid, and transferring the workpiece from the movable member to the pedestal portion further comprises:

moving the movable member relative to the pedestal portion by contact with the lid, as the lid is moved from the open position toward the closed position, to transfer the workpiece from the movable member to the pedestal portion.

20. The method of claim 17 further comprising:

after processing the workpiece, releasing the force transferred from the upper electrode to the movable member; and

resiliently biasing the movable member away from the lower electrode, as the force is released, so that the workpiece is transferred from the pedestal portion to the movable member.

21. The method of claim 16 further comprising:

after processing the workpiece, resiliently biasing the movable member away from the pedestal portion so that the workpiece is transferred from the pedestal portion to the movable member.

22. The method of claim 16 wherein transferring the workpiece to the movable member further comprises:

supporting the workpiece on an end effector; and

manipulating the end effector carrying the supported workpiece to transfer the workpiece from a position outside of the process chamber to the movable member and without guiding the workpiece during the transfer.

23. The method of claim 22 further comprising:

after processing the workpiece, manipulating the end effector to remove the workpiece from the movable member to the position outside of the process chamber and without guiding the workpiece during the transfer.