

CLAIMS

1. A workpiece carrier comprising:

a substrate;

an electrode formed on the substrate to carry an electric charge to grip a workpiece, wherein the electrode comprises an inner central electrode and an outer peripheral electrode, wherein the inner central electrode is interdigitated with the outer peripheral electrode with each digit of the inner central electrode extending out between two corresponding digits of the outer peripheral electrode, wherein digits of the outer peripheral electrode are continuous with one another, wherein a mask separates the outer peripheral electrode from the inner central electrode, the mask continuous around an entirety of the inner central electrode, and wherein the outer peripheral electrode has a charge polarity different from a charge polarity of the inner central electrode;

a through hole through the substrate and connected to the electrode, wherein the through hole contains a metal layer to provide an electrical contact electrically coupled to the electrode; and

a dielectric layer over the substrate to isolate the electrode from the workpiece.

2. The workpiece carrier of Claim 1, wherein the substrate comprises a silicon wafer.

3. The workpiece carrier of Claim 1, wherein the electrode comprises patterned tantalum.

4. The workpiece carrier of Claim 1, wherein the electrode is applied to the substrate by plasma vapor deposition.

5. The workpiece carrier of Claim 1, wherein the metal layer is a conductive plug.

6. The workpiece carrier of Claim 1, further comprising a bond pad over the through hole on a side of the substrate opposite the electrode, the bond pad providing an electrical connection to the electrode from the opposite side.

7. The workpiece carrier of Claim 1, wherein the electrode is on a front side of the substrate, the workpiece carrier further comprising an additional dielectric layer on the back side of the substrate.

8. The workpiece carrier of Claim 7, wherein the back side dielectric is in contact with the substrate with no intervening metal layer.

9. The workpiece carrier of Claim 1, further comprising a plurality of through holes extending from a back side of the substrate through the dielectric layer to provide access to a back side of the workpiece.

10. The workpiece carrier of Claim 1, wherein the substrate is comprised of at least one of glass, polysilicon, and ceramic.

11. A plasma processing system comprising:

a plasma chamber;

a plasma source to generate a plasma containing gas ions in the plasma chamber;

and

a workpiece holder in the chamber having a puck to carry the workpiece for fabrication processes, a top plate thermally coupled to the puck, and a cooling plate fastened to and thermally coupled to the top plate, the cooling plate having a cooling channel to carry a heat transfer fluid to transfer heat from the cooling plate,

the workpiece being a thinned silicon wafer that is carried by workpiece carrier so that the carrier is carried by the puck, the workpiece carrier including a substrate, an electrode formed on the substrate to carry an electric charge to grip the thinned silicon wafer, a through hole through the substrate and connected to the electrode, and a dielectric layer over the substrate to isolate the electrode from the thinned silicon wafer, wherein the through hole contains a metal layer to provide an electrical contact electrically coupled to the electrode, wherein the electrode comprises an inner central electrode and an outer peripheral electrode, wherein the inner central electrode is interdigitated with the outer peripheral electrode with each digit of the inner central electrode extending out between two corresponding digits of the outer peripheral electrode, wherein digits of the outer peripheral electrode are continuous with one another, wherein a mask separates the outer peripheral electrode from the inner central electrode, the mask continuous around an entirety of the inner central electrode, and wherein the outer peripheral electrode has a charge polarity different from a charge polarity of the inner central electrode.

12. The system of Claim 11, further comprising a second through hole in the substrate extending between the dielectric layer and a second side of the substrate as an access port to the thinned silicon wafer.

13. The system of Claim 12, further comprising forming a vacuum fitting on the second through hole.