CLAIMS:

1. An external clamp ring for a chemical mechanical polishing carrier head, the external clamp ring comprising:

a cylindrical body having a top surface, a bottom surface, an outer cylindrical wall and an inner cylindrical wall; and

a hydrophobic layer disposed on the outer cylindrical wall and the inner cylindrical wall of the body, whereas the top surface and the bottom surface do not have the hydrophobic layer disposed thereon.

2. The external clamp ring of claim 1, wherein the hydrophobic layer has a thickness of between about 400 nm and about 100 nm.

3. The external clamp ring of claim 1 wherein the top surface and bottom surface have a width shorter than a height of the inner and outer cylindrical walls.

4. The external clamp ring of claim 3, wherein the width of the top surface and bottom surface may be less than a quarter of the height of the inner and outer cylindrical walls.

5. The external clamp ring of claim 1, wherein the cylindrical body further comprises:

a thin cylindrical band.

6. The external clamp ring of claim 1, wherein the hydrophobic coating on the outer cylindrical wall comprises:

a surface roughness of less than or equal to about 16 micro-inches Ra.

7. The external clamp ring of claim 1, wherein the outer cylindrical wall comprises:

a surface roughness of less than or equal to about 16 micro-inches Ra.

8. The external clamp ring of claim 7, wherein the inner cylindrical wall comprises:

a surface roughness of less than or equal to about 16 micro-inches Ra.

9. The external clamp ring of claim 1, wherein the hydrophobic coating comprises:

a silicon-based coating material, or a carbon containing material.

10. The external clamp ring of claim 1, wherein the hydrophobic coating comprises:

a silicon-based coating material consisting of carboxysilane.

11. The external clamp ring of claim 1, wherein the hydrophobic coating comprises:

a PTFE-based coating material selected from the group consisting of perfluoroalkoxy alkane (PFA), fluorinated ethylene propylene (FEP).

12. The external clamp ring of claim 1, wherein the hydrophobic coating comprises:

a carbon containing material selected form the group consisting of parylene (polyparaxylylene), Parylene C (chlorinated linear polyparaxylylene), Parylene N (linear polyparaxylylene), Parylene X (cross-linked polyparaxylylene), polyether ether ketone and diamond-like carbon (DLC).

13. The external clamp ring of claim 1, wherein the hydrophobic coating is applied using an additive manufacturing operation, spraying or dipping.

14. An external clamp ring for a chemical mechanical polishing carrier head, the external clamp ring comprising:

a thin cylindrical band having a top wall, a bottom wall, an outer cylindrical wall and an inner cylindrical wall; and

a hydrophobic layer disposed on the outer cylindrical wall and inner cylindrical wall and not the top wall or bottom wall, the hydrophobic layer comprising a silicon-based coating material.

15. The external clamp ring of claim 14, wherein the hydrophobic layer has a thickness of between about 400 nm and about 100 nm.

16. The external clamp ring of claim 14, wherein the hydrophobic coating on the outer cylindrical wall comprises:

a surface roughness of less than about 16 micro-inches Ra.

17. The external clamp ring of claim 14, wherein the outer cylindrical wall comprises:

a surface roughness of less than or equal to about 16 micro-inches Ra.

18. The external clamp ring of claim 17, wherein the hydrophobic coating on the inner cylindrical wall comprises:

a surface roughness of less than or equal to about 32 micro-inches Ra.

19. The external clamp ring of claim 14, wherein the hydrophobic coating comprises:

a coating material selected from the group consisting of carboxysilane, parylene (polyparaxylylene), Parylene C (chlorinated linear polyparaxylylene), Parylene N (linear polyparaxylylene), Parylene X (cross-linked polyparaxylylene), polyether ether ketone and diamond-like carbon (DLC).

20. A carrier head comprising:

a body having a top surface and a lower surface, the lower surface of the body having a mounting ring extending therefrom;

a retaining ring coupled to the body;

a flexible membrane disposed inward of and circumscribed by the retaining ring, the flexible member having an outerside configured to contact a substrate retained in the carrier head; and

an external clamp ring securing the flexible membrane to the mounting ring, the external clamp ring having an upper wall, a lower wall, inner cylindrical wall and an outer cylindrical wall facing the retaining ring in a spaced apart relationship, the inner cylindrical wall and the outer cylindrical wall coated with a hydrophobic coating omitted from both the upper wall and the lower wall.