CLAIMS

1. A pedestal for a plasma processing system, comprising:

a substrate supporting surface;

an annular edge ring arranged around a periphery of the substrate supporting surface; and

a diamond coating arranged on a plasma-exposed surface of the annular edge ring,

wherein the diamond coating includes sp3 bonds, and

wherein a purity of the sp3 bonds in the diamond coating is greater than 99%.

2. The pedestal of claim 1, wherein the diamond coating is deposited on the annular edge ring using chemical vapor deposition (CVD).

3. A plasma processing system comprising:

a processing chamber, wherein the pedestal of claim 1 is arranged in the processing chamber; and

a plasma source to create plasma in the processing chamber.

4. The plasma processing system of claim 3, wherein the plasma source includes a capacitively-coupled plasma (CCP) source.

5. The plasma processing system of claim 3, wherein the plasma source includes an inductively-coupled plasma (ICP) source.

6. A plasma processing system comprising:

a processing chamber, wherein the pedestal of claim 1 is arranged in the processing chamber; and

a remote plasma source to supply plasma to the processing chamber.

7. A plasma processing system, comprising:

a processing chamber;

a plasma source to one of supply plasma to the processing chamber and create plasma in the processing chamber; and

at least one component arranged in the processing chamber including a diamond coating,

wherein the diamond coating includes sp3 bonds, and

wherein a purity of the sp3 bonds in the diamond coating is greater than 99%.

8. The plasma processing system of claim 7, wherein the diamond coating is deposited on the at least one component using chemical vapor deposition (CVD).

9. The plasma processing system of claim 7, wherein the at least one component is selected from a group consisting of:

an edge ring;

a chamber wall;

a gas distribution device;

a gas injector;

a window into the processing chamber; and

an upper surface of a pedestal.

10. An edge ring for a plasma processing system, comprising:

an annular ring; and

a diamond coating arranged on a surface of the annular ring that is exposed to plasma during use,

wherein the diamond coating includes sp3 bonds, and

wherein a purity of the sp3 bonds in the diamond coating is greater than 99%.

11. The edge ring of claim 10, wherein the diamond coating is deposited on the annular ring using chemical vapor deposition (CVD).

12. The edge ring of claim 10, wherein the annular ring is made of a material selected from a group consisting of silicon (Si), silicon carbide (SiC) and silicon dioxide (SiO_2).

13. The edge ring of claim 10, wherein the diamond coating has a thickness of 1μm to 1mm.

14. The edge ring of claim 10, wherein the diamond coating has a thickness of 100μm to 1mm.