According to an aspect of the present disclosure, there is provided an article comprising a substrate, a protective film overlaying at least part of the substrate, the protective film consisting of a carbon-doped fluorinated metal oxide with a carbon concentration not lower than 0.1at% and not higher than 10at%, wherein the metal of the carbon-doped fluorinated metal oxide is selected from the group consisting of one or more elements of the Group III, Group IV elements of the periodical system of elements, and combinations thereof, wherein the article is a plasma etch chamber component and/or part and preferably an article of the group formed by electrostatic chuck, a ring, a process kit ring, a single ring, a chamber wall, a shower head, a nozzle, a lid, a liner, a window, a baffle or a fastener.

According to the present disclosure, the article comprises an improved coating, wherein the improved coating may be formed as a thin film comprising fluorinated metal oxide, wherein the thin film in addition comprises carbon with a concentration being in the range from 0.1 at% to 10 at%, preferably between 0.5at% and 2.5at%. The metal of the fluorinated metal oxide may be one or more element of the group III and or group IV elements of the periodical system. More preferably the metal may contain Yttrium or may be Yttrium.

According to another example, the protective film may comprise a gradient layer with increasing fluorine concentration measured from a deeper part of the protective film to a less deep part of the protective film and/or the protective film may be a multilayer

Claims

1. An article comprising

- a substrate

- a protective film overlaying at least part of the substrate, the protective film consisting of a carbon-doped fluorinated metal oxide with a carbon concentration not lower than 0.1at% and not higher than 10at%, wherein the metal of the carbon-doped fluorinated metal oxide is selected from the group consisting of one or more elements of the Group III, Group IV elements of the periodical system of elements, and combinations thereof, wherein the article is a plasma etch chamber component and/or part and preferably an article of the group formed by electrostatic chuck, a ring, a process kit ring, a single ring, a chamber wall, a shower head, a nozzle, a lid, a liner, a window, a baffle or a fastener.

2. Article according to claim 1, characterized in that the carbon concentration is not lower than 0.5at% and not higher than 2.5at%.

3. Article according to claim 1 or 2, characterized in that the metal of the protective film contains Yttrium and preferably is Yttrium.

4. Article according to one of the preceding claims, characterized in that the protective film has a coating thickness not less than 0.1 µm and not more than 30 µm.

5. Article according to one of the preceding claims, characterized in that the protective film has a roughness of Ra < 1 µm, preferably, Ra < 0.25 µm, most preferably Ra < 0.025 µm.

6. Article according to one of the preceding claims, characterized in that the protective film has a reduced peak height of Rpk < 0.25 µm, preferably Rpk < 0.10 µm, most preferably Rpk < 0.025 µm.

7. Article according to one of the preceding claims, characterized in that the protective film has a hardness of at least 10 GPa as determined by nanoindentation with a fixed load of 5mN, while the indentation depth is maintained below 10% of the coating thickness.

8. Article according to one of the preceding claims, characterized in that between the protective film and the substrate is an adhesion-promoting layer being a second metal or second metal oxide, where the metal of the film and second metal are preferably identical.

9. Article according to one of the preceding claims, characterized in that the protective film comprises a gradient layer with increasing fluorine concentration measured from a deeper part of the protective film to a less deep part of the protective film and/or the protective film is a multilayer system comprising at least two layers with different fluorine concentrations with the fluorine concentration in the layer more distant to the substrate being higher than the fluorine concentration in the layer closer to the substrate.

10. Article according to one of the preceding claims, characterized in that the protective film comprises a gradient layer starting close to the substrate from pure M203 to MaObFcCd, wherein M represents one or more elements of the Group III and/or Group IV elements of the periodical system of elements, in which the concentration of MaObFcCd are preferably chosen as follows: $0.25 < a < 0.4$, $0.2 < b < 0.6$, $0.1 < c < 0.6$ and $0.01 < d < 0.1$ with $a+b+c+d = 1$.

11. Article according to one of the preceding claims, characterized in that between the protective film or if given the adhesion promoting layer and the substrate foreseen is a Y-containing thermally sprayed precoat, preferably comprising Y_2O_3 and/or YOF.

12. Method for producing an article according to one of the preceding claims, characterized in that the protective film overlaying at least a part of the substrate is applied by Physical Vapor Deposition (PVD) and/or Chemical Vapor Deposition (CVD).