layers with finer pores and better protection compared to plasma etching processes it is not expected to destroy a metallic layer located under the ceramic layer.

Objective of the present invention

It is an object of the present invention to alleviate or to overcome one or more difficulties related to the prior art. In particular, it is an object of the present invention to provide a method for producing a device as well as a device, which has a high surface resistance in plasma etching processes, can be easily and quickly surface renewed as required and offers great flexibility with regard to the selection of coating materials.

Summary

In one aspect, there is provided a method for producing a device to be used within a plasma etching chamber for the manufacturing of semiconductor components, comprising: - providing a body forming the substrate of the device, - applying a first coating of a pure metal layer and/or a pure metal alloy on the surface of the body, in order to form a metal coated body, wherein the metal layer and/or the metal alloy comprises at least one of the following metals: Al, V, Ti, Hf, Y, Er, Sc, Ce, La, - applying a second coating on the metal coated body, wherein the second coating comprises a ceramic coating layer comprising or consisting of aluminum oxynitride (AlON), wherein the second coating directly or indirectly overlaps with the first coating.

In another aspect, there is provided a device to be used within a plasma etching chamber for the manufacturing of semiconductor components comprising: - a body forming the substrate of the device, - a first coating applied on the surface of the body, wherein the first coating is a pure metal and/or metal alloy thin film comprising at least one of the following metals: Al, V, Ti, Hf, Y, Er, Sc, Ce, La, - a second coating on the metal coated body, wherein the second coating comprises a ceramic coating layer comprising or consisting of aluminum oxynitride (AlON), wherein the second coating at least partially overlaps with the first coating.

Description of the present invention

In order to overcome these problems, a method for producing a device to be used within a plasma etching chamber for the manufacturing of semiconductor components has been invented. Thus, in a first aspect of the present invention disclosed is a method for producing a device to be used within a plasma etching chamber for the manufacturing of semiconductor components comprising:

- providing a body forming the substrate of the device,
- applying a first coating on the surface of the body, wherein the first coating comprises a metal and/or a metal alloy thin film coating layer in order to form a metal coated body,
- applying a second coating on the metal coated body, wherein the second coating comprises a ceramic coating layer, wherein the second coating at least partially overlaps with the first coating.

Hereby, the device may preferably be designed as an electrostatic chuck. Moreover, the first and/or second coating may be applied at least partially on the surface of the body of the device. The term that the second coating at least partially overlaps with the first coating may preferably be understood in that the second coating may be at least partially applied over the first coating which includes a direct connection as well as an indirect connection between the first and the second coating.

Claims

1. Method for producing a device to be used within a plasma etching chamber for the manufacturing of semiconductor components, comprising:
- providing a body forming the substrate of the device,
- applying a first coating of a pure metal layer and/or a pure metal alloy on the surface of the body, in order to form a metal coated body, wherein the metal layer and/or the metal alloy comprises at least one of the following metals: Al, V, Ti, Hf, Y, Er, Sc, Ce, La,
- applying a second coating on the metal coated body, wherein the second coating comprises a ceramic coating layer comprising or consisting of aluminum oxynitride (AlON), wherein the second coating directly or indirectly overlaps with the first coating.

2. Method according to claim 1, wherein the method comprises manufacturing the body, wherein the manufacturing comprises uncoating the body, preferably by polishing and cleaning the surface of the body, wherein in particular plasma methods and/or ion bombardment is used for cleaning and/or activating the surface.

3. Method according to claim 1 or 2, wherein the manufacturing comprises treating the body with an alkaline or oxidizing substance to dissolve existing coatings from the surface of the body.

4. Method according to one of the previous claims, wherein an intermediate coating comprising metallic and ceramic components is applied between the first coating and the second coating, wherein the intermediate coating is applied preferably by using a controlled feed of reactive gases forming the ceramic components while continuously decreasing the addition of metallic components in order to create a gradient of the metallic component within the intermediate coating starting with a higher amount of the metallic compound at the interface to the first coating and finishing with a lower amount of the metallic compound at the interface to the second coating, wherein in particular the feed of the reactive gases forming the ceramic components and/or the addition of the metallic compound is variated at least partially stepwise and/or at least partially continuously.

5. Method according to one of the previous claims, wherein the method comprises a step of micro- and/or nanostructuring the device, wherein the structures being introduced by micro- and/or nanostructuring preferably are made in form of grating structures, in particular introduced into the body of the device.

6. Method according to one of the previous claims, wherein vacuum coating methods are used for applying the first coating and/or the second coating and/or the intermediate coating, wherein preferably CVD- or PVD-techniques, in particular magnetron sputtering techniques are used.

7. Method according to one of the previous claims, wherein as the second coating a pure ceramic layer is applied to the surface of the body, wherein the ceramic layer preferably comprises at least one of the following: oxides, nitrides, oxynitrides, silicates, fluorides, carbides, oxyfluorides, wherein the reactive gases to form the ceramics in particular are fed slowly and ramped.

8. Device to be used within a plasma etching chamber for the manufacturing of semiconductor components comprising:
- a body forming the substrate of the device,
- a first coating applied on the surface of the body, wherein the first coating is a pure metal and/or metal alloy thin film comprising at least one of the following metals: Al, V, Ti, Hf, Y, Er, Sc, Ce, La,
- a second coating on the metal coated body, wherein the second coating comprises a ceramic coating layer comprising or consisting of aluminum oxynitride (AlON),
wherein the second coating at least partially overlaps with the first coating.

9. Device according to claim 8, wherein the device comprises additionally an intermediate coating, wherein the intermediate coating comprises metallic and ceramic components, which are preferably inhomogeneously distributed within the layer.

10. Device according to claim 9, wherein the metallic portion within the intermediate coating continuously decreases starting from the interface between the intermediate coating and the first coating to the interface between the intermediate coating and the second coating and wherein at the same time the ceramic portion within the layer continuously increases starting from the interface between the intermediate coating and

the first coating to the interface between the intermediate coating and the second coating, wherein the ratio of the metallic component and the ceramic component to each other preferably changes at least partially stepwise and/or at least continuously.

11. Device according to one of claims 8 to 10, wherein the second coating and if given the intermediate coating comprises pores, wherein the pores preferably have a different pore diameter at a pore inlet and a pore outlet, wherein the diameter of the pores at the pore inlet adjacent to the second coating is in particular smaller than at the pore outlet adjacent to the first coating.

12. Device, according to one of claims 8 to 11, wherein the device comprises micro- and/or nanostructured parts, wherein the micro- and/or nanostructured parts preferably are made in form of grid structures, in particular introduced into the body of the device.

13. The device of claim 12, wherein the grid structures comprise protrusions and apertures disposed between two neighbouring protrusions, wherein the apertures preferably comprising a constriction disposed between two neighbouring protrusions adjacent to the second coating, wherein the diameter of the apertures in particular increases continuously from the constriction to the bottom of the grid within the apertures.

14. Device according to claim 12 or 13, wherein the ceramic top layer is applied partially on the surface of the body, wherein the ceramic top layer preferably does not extend to the bottom of the grid within the apertures, wherein the bottom of the grid is only coated with a metallic coating.

15. Device according to one of the claims 8 to 14, wherein the second coating is a pure ceramic layer, preferably comprising at least one of the following: oxides, nitrides, oxynitrides, silicates, fluorides, carbides, oxyfluorides.

16. Device according to one of the claims 8 to 15, wherein the micro- and/or nanostructured parts are designed in the form of a periodic grid structure, wherein the distances between two adjacent protrusions are preferably at least 200 nm in width, in particular at least 400 nm in width.

17. Device according to one of the claims 8 to 16, wherein the device is inhomogeneously coated along its surface, wherein the layer thickness of the first and/or second coating and/or the intermediate coating being thinner at some points than at other points at the surface.

18. Device according to one of claims 8 to 17, wherein the device is an electrostatic chuck or a hard shadow masking device.