

CLAIMS

1. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method which is used such that~~
~~wherein~~ the ~~SiC~~CVD-SiC structure is exposed to plasma inside a chamber, ~~and the plasma~~
~~is arranged to shine down from a top of the chamber,~~

5 wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in which a
length in a first direction is longer than a length in a second direction when defining a
direction perpendicular to a surface most exposed to the plasma as the first direction and a
direction horizontal to the surface most exposed to the plasma as the second direction and
the crystal grains are aligned so as to have a maximum length in -45° to $+45^{\circ}$ directions
10 based on the first direction;

wherein, with respect to peak intensities for the first direction and the second
direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of
the first direction/a peak intensity in the (111) crystal plane direction of the second
direction is 0.2 to 0.95;

15 wherein the CVD-SiC structure includes a first surface which is most exposed to
the plasma and developed in a direction perpendicular to the first direction and a second
surface which is perpendicular to the first surface and developed in a direction
perpendicular to the second direction.

20 2. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that~~
~~wherein~~ the ~~SiC~~CVD-SiC structure is exposed to plasma inside a chamber, ~~and the plasma~~
~~is arranged to shine down from a top of the chamber,~~

wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in
which a length in a first direction is longer than a length in a second direction when
25 defining a direction perpendicular to a surface most exposed to the plasma as the first
direction and a direction horizontal to the surface most exposed to the plasma as the
second direction and a value (aspect ratio) of the length in the first direction of the crystal
grains/the length in the second direction of the crystal grains is 1.2 to 20;

wherein, with respect to peak intensities for the first direction and the second
30 direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of
the first direction/a peak intensity in the (111) crystal plane direction of the second
direction is 0.2 to 0.95;

wherein the CVD-SiC structure includes a first surface which is most exposed to
the plasma and developed in a direction perpendicular to the first direction and a second

surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.

3. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that~~
 5 ~~wherein~~ the ~~SiC~~CVD-SiC structure is exposed to plasma inside a chamber, ~~and the plasma~~
is arranged to shine down from a top of the chamber,

wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in which a
 length in a first direction is longer than a length in a second direction when defining a
 direction perpendicular to a surface most exposed to the plasma as the first direction and a
 10 direction horizontal to the surface most exposed to the plasma as the second direction and
 a value of the average strength in the first direction/the average strength in the second
 direction is 0.55 to 0.9;___

wherein, with respect to peak intensities for the first direction and the second
direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of
 15 the first direction/a peak intensity in the (111) crystal plane direction of the second
direction is 0.2 to 0.95;___

wherein the CVD-SiC structure includes a first surface which is most exposed to
the plasma and developed in a direction perpendicular to the first direction and a second
surface which is perpendicular to the first surface and developed in a direction
 20 perpendicular to the second direction.

4. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that~~
wherein the ~~SiC~~CVD-SiC structure is exposed to plasma inside a chamber, ~~and the plasma~~
is arranged to shine down from a top of the chamber,

25 wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in
 which a length in a first direction is longer than a length in a second direction when
 defining a direction perpendicular to a surface most exposed to the plasma as the first
 direction and a direction horizontal to the surface most exposed to the plasma as the
 second direction and a resistivity

in the first direction is $3.0 \times 10^{-3} \Omega\text{cm}$ to $25 \Omega\text{cm}$, and a resistivity in the second direction is $1.4 \times 10^{-3} \Omega\text{cm}$ to $40 \Omega\text{cm}$;

wherein, with respect to peak intensities for the first direction and the second direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of the first direction/a peak intensity in the (111) crystal plane direction of the second direction is 0.2 to 0.95;

wherein the CVD-SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.

5. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that~~ wherein the SiCCVD-SiC structure is exposed to plasma inside a chamber, and the plasma is arranged to shine down from a top of the chamber,

wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in which a length in a first direction is longer than a length in a second direction when defining a direction perpendicular to a surface most exposed to the plasma as the first direction and a direction horizontal to the surface most exposed to the plasma as the second direction and a resistivity in the first direction is $10 \Omega\text{cm}$ to $20 \Omega\text{cm}$, and a resistivity in the second direction is $21 \Omega\text{cm}$ to $40 \Omega\text{cm}$;

wherein, with respect to peak intensities for the first direction and the second direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of the first direction/a peak intensity in the (111) crystal plane direction of the second direction is 0.2 to 0.95;

wherein the CVD-SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.

6. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that~~ wherein the SiCCVD-SiC structure is exposed to plasma inside a chamber, and the plasma is arranged to shine down from a top of the chamber,

wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in which a length in a first direction is longer than a length in a second direction when defining a

direction perpendicular to a surface most exposed to the plasma as the first direction and a direction horizontal to the surface most exposed to the plasma as the second direction and a resistivity in the first direction is 0.8 Ωcm to 3.0 Ωcm , and a resistivity in the second direction is 2.5 Ωcm to 25 Ωcm ;

wherein, with respect to peak intensities for the first direction and the second direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of the first direction/a peak intensity in the (111) crystal plane direction of the second direction is 0.2 to 0.95;

wherein the CVD-SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.

7. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that~~ wherein the ~~SiC~~CVD-SiC structure is exposed to plasma inside a chamber, and the plasma is arranged to shine down from a top of the chamber,

wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in which a length in a first direction is longer than a length in a second direction when defining a direction perpendicular to a surface most exposed to the plasma as the first direction and a direction horizontal to the surface most exposed to the plasma as the second direction and a value of a resistivity in the first direction/a resistivity in the second direction is 1.1 to 3.3;

wherein, with respect to peak intensities for the first direction and the second direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of the first direction/a peak intensity in the (111) crystal plane direction of the second direction is 0.2 to 0.95;

wherein the CVD-SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.

8. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that~~ wherein the ~~SiC~~CVD-SiC structure is exposed to plasma inside a chamber, and the plasma is arranged to shine down from a top of the chamber,

wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in which a length in a first direction is longer than a length in a second direction when defining a direction perpendicular to a surface most exposed to the plasma as the first direction and a direction

horizontal to the surface most exposed to the plasma as the second direction and a value of a hardness in the first direction/a hardness in the second direction is 0.85 to 1.15;

wherein, with respect to peak intensities for the first direction and the second direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of the first direction/a peak intensity in the (111) crystal plane direction of the second direction is 0.2 to 0.95;

wherein the CVD-SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.

9. An ~~SiC~~CVD-SiC structure, ~~formed by a CVD method, which is used such that wherein the SiC~~CVD-SiC structure is exposed to plasma inside a chamber, and the plasma is arranged to shine down from a top of the chamber,

wherein the ~~SiC~~CVD-SiC structure includes a crystal grain structure in which a length in a first direction is longer than a length in a second direction when defining a direction perpendicular to a surface most exposed to the plasma as the first direction and a direction horizontal to the surface most exposed to the plasma as the second direction and with respect to peak intensities in a crystal plane direction for the first direction and the second direction of XRD analysis,

a value of the first direction/a value of the second direction of a $[(200 + 220 + 311)]/(111)$ value is 1.0 to 4.4, and

a value of a peak intensity in the (111) crystal plane direction of the first direction/a peak intensity in the (111) crystal plane direction of the second direction is 0.2 to 0.95;

wherein the CVD-SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.

~~10. An SiC structure, formed by a CVD method, which is used such that the SiC structure is exposed to plasma inside a chamber,~~

~~wherein the SiC structure includes a crystal grain structure in which a length in a first direction is longer than a length in a second direction when defining a direction~~

perpendicular to a surface most exposed to the plasma as the first direction and a direction horizontal to the surface most exposed to the plasma as the second direction and with respect to peak intensities for the first direction and the second direction of XRD analysis, a value of a peak intensity in a (111) crystal plane direction of the first direction/a peak intensity in the (111) crystal plane direction of the second direction is 0.2 to 0.95.

11. ~~The SiC structure, formed by a CVD method of claims 1 to 10, wherein the SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction.~~

1012. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein an average strength in the first direction is 133 Mpa to 200 Mpa and an average strength in the second direction is 225 Mpa to 260 Mpa.

1113. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a value of a resistivity in the first direction/a resistivity in the second direction is 0.25 to 0.95.

1214. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a value of a resistivity in the first direction/a resistivity in the second direction is 0.04 to 0.99.

1315. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a resistivity in the first direction is 1.8 Ωcm to 3.0 Ωcm , and a resistivity in the second direction is 0.8 Ωcm to 1.7 Ωcm .

1416. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a value of a resistivity in the first direction/a resistivity in the second direction is 1.15 to 3.2.

1517. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a resistivity in the first direction is $3.0 \times 10^{-3} \Omega\text{cm}$ to $5.0 \times 10^{-3} \Omega\text{cm}$, and a resistivity in the second direction is $1.4 \times 10^{-3} \Omega\text{cm}$ to $3.0 \times 10^{-3} \Omega\text{cm}$.

1618. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a hardness of the SiC/CVD-SiC structure is 2800 kgf/mm^2 to 3300 kgf/mm^2 regardless of a direction.

1719. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein with respect to peak intensities in a crystal plane direction for the first direction and the second direction of XRD analysis,

$[(200 + 220 + 311)]/(111)$ values are 0.7 to 2.1 in the first direction and 0.4 to 0.75 in the second direction, respectively.

1820. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein with respect to peak intensities for the first direction and the second direction of XRD analysis, the peak intensities in a (111) crystal plane direction are 3200 to 10000 in the first direction and 10500 to 17500 in the second direction, respectively.

1921. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a thermal expansion coefficient in the first direction is $4.0 \times 10^{-6}/^\circ\text{C}$ to $4.6 \times 10^{-6}/^\circ\text{C}$, and the thermal expansion coefficient in the second direction is $4.7 \times 10^{-6}/^\circ\text{C}$ to $5.4 \times$

$10^{-6}/^{\circ}\text{C}$.

2022. The ~~SiC~~CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a value of

a thermal expansion coefficient in the first direction/a thermal expansion coefficient in the second direction is 0.7 or more and less than 1.0.

2123. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a thermal conductivity in the first direction is 215 W/mk to 260 W/mk, and a thermal conductivity in the second direction is 280 W/mk to 350 W/mk.

2224. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein a value of a thermal conductivity in the first direction/a thermal conductivity in the second direction is 0.65 to less than 1.0.

2325. The SiC/CVD-SiC structure ~~formed by the CVD method~~ of claim 1, ~~wherein the SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction,~~ wherein in the SiC/CVD-SiC structure, at least a part of the first surface suitable for being ~~is~~ in contact with a support part.

2426. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, wherein the SiC/CVD-SiC structure is one of an edge ring, a susceptor, and a shower head.

2527. The SiC/CVD-SiC structure, ~~formed by a CVD method~~ of claims 1 to 910, ~~wherein the SiC structure includes a first surface which is most exposed to the plasma and developed in a direction perpendicular to the first direction and a second surface which is perpendicular to the first surface and developed in a direction perpendicular to the second direction,~~

wherein a total sum of areas of the first surface is larger than a total sum of areas of the second surface.