SCOPE OF THE CLAIMS:

[Claim 1]

A quartz glass crucible comprising:

a crucible base body consisting of silica glass; and

a coating film containing a crystallization accelerator and formed on an inner surface of the crucible base body,

wherein an average carbon concentration in the coating film and the crucible base body within a range of 0 μm or more and 300 μm or less in depth from the inner surface thereof is 1.0×10^{12} atoms/cc or more and 3.0×10^{19} atoms/cc or less, a variation coefficient (σ/AVERAGE) of a carbon concentration in the coating film at five points on a bottom of the crucible base body is 1.1 or less, and

the five points are determined as a first measurement point that is a center of the bottom, a second measurement point that is a position shifted by 0.08 to 0.7 times a radius in a radial direction of the crucible base body from the first measurement point, a third measurement point that is a position rotated 90° clockwise in a circumferential direction from the second measurement point, a fourth measurement point is a position rotated 90° clockwise in the circumferential direction from the third measurement point, and a fifth measurement point that is a position rotated 90° clockwise in the circumferential direction from the fourth measurement point.

[Claim 2]

The quartz glass crucible according to claim 1,

wherein a weight ratio of a carbonate in the coating film is 20.0 w% or less.

[Claim 3]

The quartz glass crucible according to claim 1 or 2,

wherein an average carbon concentration in the coating film is 3.0×10^{18}

atoms/cc or less.

[Claim 4]

The quartz glass crucible according to any one of claims 1 to 3,

wherein both of an average carbon concentration in the coating film and an average carbon concentration in the crucible base body within the range of 0 μm or more and 300 μm or less in depth from the inner surface thereof are 1.3×10^{16} atoms/cc or less.

[Claim 5]

The quartz glass crucible according to any one of claims 1 to 4,

wherein the coating film has a peel strength of 0.3 kN/m or more.

[Claim 6]

The quartz glass crucible according to any one of claims 1 to 5,

wherein a nitrogen concentration in the coating film and the crucible base body within the range of 0 μm or more and 300 μm or less in depth from the inner surface thereof is 4.7×10^{17} atoms/cc or less.

[Claim 7]

A manufacturing method of a quartz glass crucible, comprising:

a step of producing a crucible base body consisting of silica glass; and

a step of applying a coating liquid containing a crystallization accelerator on an inner surface of the crucible base body to form a coating film of the crystallization accelerator,

wherein the step of producing the crucible base body includes arc melting of silica powder having a carbon content of less than 6 ppm and used as a raw material for the inner surface of the crucible base body, using a carbon electrode having bulk specific gravity of 1.50 g/cc or more and 1.75 g/cc or less and specific resistivity of 330 μΩ·cm or more and 600 μΩ·cm or less,

the crystallization accelerator is a compound of an element (Mg, Ca, Sr, or Ba) in the group 2a, which has no carbon atoms in a molecule, and

the application of the coating liquid is performed while heating the crucible base body at a temperature of 60°C or more and 180°C or less.

[Claim 8]

The manufacturing method of a quartz glass crucible according to claim 7,

wherein before forming the coating film of the crystallization accelerator, the crucible base body is cleaned with hydrofluoric acid of semiconductor grade or higher and pure water.

[Claim 9]

The manufacturing method of a quartz glass crucible according to claim 7 or 8,

wherein the crystallization accelerator is a water-soluble compound.

[Claim 10]

The manufacturing method of a quartz glass crucible according to any one of claims 7 to 9,

wherein the application of the coating liquid is performed while heating the crucible base body such that a difference between a boiling point of a solvent in the coating liquid and a temperature of the crucible base body is −40.0°C or more and 100°C or less.

[Claim 11]

The manufacturing method of a quartz glass crucible according to any one of claims 7 to 10,

wherein the application of the coating liquid is performed while heating the crucible base body at a temperature of 100°C or more and 180°C or less.

[Claim 12]

The manufacturing method of a quartz glass crucible according to any one of claims 7 to 11,

wherein in the step of applying the coating liquid, spraying of the coating liquid is performed while heating the crucible base body under a low vacuum of 1×10^2 Pa or more and 1×10^5 Pa or less.

[Claim 13]

The manufacturing method of a quartz glass crucible according to any one of claims 7 to 12,

wherein the step of applying the coating liquid includes spraying the coating liquid using a two-fluid nozzle that mixes gas and liquid at a spray tip and sprays the mixture.

[Claim 14]

The manufacturing method of a quartz glass crucible according to claim 13,

wherein in the step of applying the coating liquid, a maximum thickness of the coating film formed by one applying is set to 0.5 μm or less, and the coating film is formed into multiple layers by alternately repeating drying of the coating film and reapplying.

[Claim 15]

The manufacturing method of a quartz glass crucible according to claim 13 or 14,

wherein a spray amount of the coating liquid is 300 mL/min or less.

[Claim 16]

A manufacturing method of a silicon single crystal, comprising pulling up a silicon single crystal using the quartz glass crucible according to any one of claims 1 to 6.