CLAIMS

Claim 1. A metal material comprising:

a metal base; and

a film provided on a surface of the metal base and containing a fluorine-containing molybdenum compound,

the fluorine-containing molybdenum compound being represented by the formula MoO_xF_y wherein x is a number from 0 to 2 and y is a number from 2 to 5,

wherein the film has a thickness of 1 nm or greater and 20 μm or smaller.

Claim 2. The metal material according to claim 1,

wherein the metal base is made of at least one selected from the group consisting of a stainless steel, a manganese steel, aluminum, an aluminum alloy, nickel, and a nickel alloy.

Claim 3. The metal material according to claim 1 or 2,

wherein the metal base is a pipe, a storage container, or a chamber, and

the film is provided on an inner surface of the metal base.

Claim 4. A method of producing a metal material, comprising

exposing a surface of a metal base to a MoF_6-containing gas at a temperature of 300°C or lower to form a film containing a fluorine-containing molybdenum compound on the surface of the metal base, wherein the film has a thickness of 1 nm or greater and 20 μm or smaller.

Claim 5. The method of producing a metal material according to claim 4,

wherein the gas has a MoF_6 concentration of 5 vol% or higher and 100 vol% or lower.

Claim 6. A method of passivating a semiconductor processing device including a chamber made of a metal material and a pipe connected to the chamber, the method comprising

exposing an inner surface of the chamber and an inner surface of the pipe to a MoF_6-containing gas at a temperature of 300°C or lower to form a film containing a fluorine-containing molybdenum compound on the inner surface of the chamber, wherein the film has a thickness of 1 nm or greater and 20 μm or smaller.

Claim 7. The method of passivating a semiconductor processing device according to claim 6,

wherein the pipe is made of a metal material, and

the film is formed also on the inner surface of the pipe.

Claim 8. A method of producing a semiconductor device, comprising:

performing the method of passivating a semiconductor processing device according to claim 6 or 7; and

passing a MoF_6-containing gas through the semiconductor processing device.

Claim 9. A method of producing a filled container,

comprising:

exposing an inner surface of a storage container made of a metal material to a MoF_6-containing gas at a temperature of 300°C or lower to form a film containing a fluorine-containing molybdenum compound on the inner surface of the storage container, wherein the film has a thickness of 1 nm or greater and 20 μm or smaller; and

filling the storage container with a MoF_6-containing gas.