CLAIMS

[Claim 1]

A product formed of a cobalt based alloy, the cobalt based alloy having a chemical composition comprising:

0.08 to 0.25 mass % of carbon;

0.1 mass % or less of boron;

10 to 30 mass % of chromium;

5 mass % or less of iron, 30 mass % or less of nickel, the total amount of the iron and the nickel being 30 mass % or less;

tungsten and/or molybdenum, the total amount of the tungsten and the molybdenum being 5 to 12 mass %;

titanium, niobium and tantalum, the total amount of the titanium, the niobium and the tantalum being 0.5 to 2 mass %;

0.5 mass % or less of silicon;

0.5 mass % or less of manganese;

0.003 to 0.04 mass % of nitrogen; and

the balance being cobalt and impurities, the impurities including 0.5 mass % or less of aluminum, less than 0.05 mass % of zirconium, and 0.04 mass % or less of oxygen,

wherein the product is a polycrystalline body of matrix phase crystal grains, and

wherein in the matrix phase crystal grains of the polycrystalline body, segregation cells with an average size of 0.13 to 2 μm are formed, in which components constituting an MC type carbide phase comprising the titanium, the niobium and/or the tantalum are segregated in boundary regions of the segregation cells.

[Claim 2]

The product according to claim 1, wherein

grains of the MC type carbide phase are precipitated on the boundary regions of the segregation cells.

[Claim 3]

The product according to claim 1 or 2, wherein

the chemical composition comprises 0.01 to 1 mass % of the titanium, 0.02 to 1 mass % of the niobium, and 0.05 to 1.5 mass % of the tantalum.

[Claim 4]

The product according to any one of claims 1 to 3, wherein:

the chemical composition further comprises hafnium and/or vanadium, the total amount of the hafnium, the vanadium, the titanium, the niobium and the tantalum being 0.5 to 2 mass %; and

the MC type carbide phase comprises the hafnium, the vanadium, the titanium, the niobium and/or the tantalum.

[Claim 5]

The product according to claim 4, wherein:

in the case that the chemical composition includes the hafnium, content of the hafnium is 0.01 to 0.5 mass %; and

in the case that the chemical composition includes the vanadium, content of the vanadium is 0.01 to 0.5 mass %.

[Claim 6]

The product according to any one of claims 1 to 5, wherein

the product exhibits a creep rupture time of 1,100 hours or more by a creep test under conditions of a temperature of 900°C and a stress of 98 MPa.

[Claim 7]

The product according to any one of claims 1 to 6, wherein

the product is a high temperature member.

[Claim 8]

The product according to claim 7, wherein

the high temperature member is a turbine stator blade, a turbine rotor blade, a turbine combustor nozzle, or a heat exchanger.

[Claim 9]

A product formed of a cobalt based alloy, the cobalt based alloy having a chemical composition comprising:

0.08 to 0.25 mass % of carbon;

0.1 mass % or less of boron;

10 to 30 mass % of chromium;

5 mass % or less of iron, 30 mass % or less of nickel, the total amount of the iron and the nickel being 30 mass % or less;

tungsten and/or molybdenum, the total amount of the tungsten and the molybdenum being 5 to 12 mass %;

titanium, niobium and tantalum, the total amount of the titanium, the niobium and the tantalum being 0.5 to 2 mass %;

0.5 mass % or less of silicon;

0.5 mass % or less of manganese;

0.003 to 0.04 mass % of nitrogen; and

the balance being cobalt and impurities, the impurities including 0.5 mass % or less of aluminum, less than 0.05 mass % of zirconium, and 0.04 mass % or less of oxygen,

wherein the product is a polycrystalline body of matrix phase crystal grains, and

wherein in the matrix phase crystal grains of the polycrystalline body, post segregation cells with an average size of 0.13 to 2 μm are formed, in which grains of an MC type carbide phase comprising the titanium, the niobium and/or the tantalum are

dispersedly precipitated along boundaries of the post segregation cells.

[Claim 10]

The product according to claim 9, wherein

the chemical composition comprises 0.01 to 1 mass % of the titanium, 0.02 to 1 mass % of the niobium, and 0.05 to 1.5 mass % of the tantalum.

[Claim 11]

The product according to claim 9 or 10, wherein:

the chemical composition further comprises hafnium and/or vanadium, the total amount of the hafnium, the vanadium, the titanium, the niobium and the tantalum being 0.5 to 2 mass %; and

the MC type carbide phase comprises the hafnium, the vanadium, the titanium, the niobium and/or the tantalum.

[Claim 12]

The product according to claim 11, wherein:

in the case that the chemical composition includes the hafnium, content of the hafnium is 0.01 to 0.5 mass %; and

in the case that the chemical composition includes the vanadium, content of the vanadium is 0.01 to 0.5 mass %.

[Claim 13]

The product according to any one of claims 9 to 12, wherein

the product exhibits a creep rupture time of 1,100 hours or more by a creep test under conditions of a temperature of 900°C and a stress of 98 MPa.

[Claim 14]

The product according to any one of claims 9 to 13, wherein

the product is a high temperature member.

[Claim 15]

The product according to claim 14, wherein

the high temperature member is a turbine stator blade, a turbine rotor blade, a turbine combustor nozzle, or a heat exchanger.