Claims

1. An alloy member having a chemical composition comprising elements of Co, Cr, Fe, Ni, and Ti each in an amount within a range of 5 atomic% or more and 35 atomic% or less and Mo in an amount within a range of more than 0 atomic% and 8 atomic% or less, the remainder consisting of unavoidable impurities, wherein ultrafine grains having an average grain diameter of 100 nm or less are dispersed and precipitated in a parent phase crystal grain,

wherein the average crystal grain diameter of the parent phase crystal grain is 100 μm or less.

2. The alloy member according to claim 1,

wherein the ultrafine grain is a crystalline grain in which the Ni component and the Ti component are more enriched than in the parent phase crystal.

3. The alloy member according to any one of claims 1 to 2,

wherein the chemical composition comprises 20 atomic% or more and 35 atomic% or less of Co; 10 atomic% or more and 25 atomic% or less of Cr; 10 atomic% or more and 25 atomic% or less of Fe; 15 atomic% or more and 30 atomic% or less of Ni; and 5 atomic% or more and 15 atomic% or less of Ti.

4. The alloy member according to any one of claims 1 to 2,

wherein the chemical composition comprises 25 atomic% or more and 33 atomic% or less of Co; 15 atomic% or more and 23 atomic% or less of Cr; 15 atomic% or more and 23 atomic% or less of Fe; 17 atomic% or more and 28 atomic% or less of Ni; 5 atomic% or more and 10 atomic% or less of Ti; and 1 atomic% or more and 7 atomic% or less of Mo.

5. The alloy member according to claim 4,

wherein the chemical composition comprises 25 atomic% or more and less than 30 atomic% of Co; 15 atomic% or more and less than 20 atomic% of Cr; 15 atomic% or more and less than 20 atomic% of Fe; 23 atomic% or more and 28 atomic% or less of Ni; 7 atomic% or more and 10 atomic% or less of Ti; and 1 atomic% or more and 7 atomic% or less of Mo.

6. The alloy member according to claim 4,

wherein the chemical composition comprises 30 atomic% or more and 33 atomic% or less of Co; 20 atomic% or more and 23 atomic% or less of Cr; 20 atomic% or more and 23 atomic% or less of Fe; 17 atomic% or more and less than 23 atomic% of Ni; 5 atomic% or more and less than 7 atomic% of Ti; and 1 atomic% or more and 3 atomic% or less of Mo.

7. The alloy member according to any one of claims 1 to 6,

wherein the alloy member has a tensile strength of 1100 MPa or more and a breaking elongation of 10% or more.

8. The alloy member according to any one of claims 1 to 7,

wherein the parent phase crystal has an equiaxed crystal shape and the crystal structure thereof comprises at least one of simple cubic system and face-centered cubic system.

9. A process for producing an alloy member comprising:

a raw material mixing and melting step of mixing and melting raw materials of the alloy to form a molten metal so that an alloy composition comprises elements of Co, Cr, Fe, Ni, and Ti each in an amount within a range of 5 atomic% or more and 35 atomic% or less and Mo in an amount within a range of more than 0 atomic% and 8 atomic% or less;

an atomizing step of forming an alloy powder from the molten metal;

an additive manufacturing step of forming an alloy laminated molded body having a desired shape by a metal powder additive manufacturing process using the alloy powder; and

a pseudo solution heat treatment step of performing a pseudo solution heat treatment on the alloy laminated molded body in a temperature range of 1080°C or more and 1180°C or less.

wherein the heat source used for a metal powder additive manufacturing process in the additive manufacturing step is a laser.

10. The process for producing an alloy member according to claim 9,

wherein the pseudo solution heat treatment step is a step of holding the alloy laminated molded body in the temperature range and then cooling the resultant with water or air.

11. The process for producing an alloy member according to claims 9 or 10, comprising an aging treatment step of performing an aging treatment in a temperature range of more than 500°C and less than 900°C after the pseudo solution heat treatment step.

12. A product comprising an alloy member,

wherein the alloy member is the alloy member according to any one of claims 1 to 8, and

the product is an impeller of a fluid machine.

13. A centrifugal compressor in which the impeller according to claim 12 is incorporated.