CLAIMS

1. A fine crystallite high-function metal alloy member, wherein the member is obtained by the method comprises the steps of adding 5 to 30000 ppm of gadolinium (Gd) to a metal alloy including a high-purity metal alloy whose crystal lattice is a face-centered cubic lattice, a body-centered cubic lattice, or a close-packed hexagonal lattice ~~is made to contain therein 5 to 30000 ppm of gadolinium (Gd)~~, cast-molding the obtained material, subjecting the cast-molded material to the solution treatment, and subjecting the said material to the ageing treatment ~~and~~ to make the crystallite thereof ~~is made~~ fine with the size in the level of nanometers (10^{-9} m to 10^{-6} m) ~~and micrometers (10^{-6} m to 10^{-3} m)~~ as the average crystallite diameters obtained by the Scherrer's equation based on an analysis by the X-ray analysis,

wherein said metal alloy including a high-purity metal alloy contains a metal selected from the group consisting of gold (Au), silver (Ag), platinum (Pt), palladium (Pd), aluminum (Al), magnesium (Mg), copper (Cu), iron (Fe) and titanium (Ti).

2. The fine crystallite high-function metal alloy member according to claim 1, wherein said gadolinium (Gd) is gadolinium (Gd) solely or gadolinium (Gd) together with at least one element selected from the group consisting of elements other than gadolinium (Gd).

3. The fine crystallite high-function metal alloy member according to claim 1 or 2, wherein said cast-molding is vacuum casting.

~~2~~4. A method for producing a fine crystallite high-function metal alloy member, wherein the method comprises the steps of adding 5 to 30000 ppm of gadolinium (Gd) to a metal alloy including a high-purity metal alloy whose crystal lattice is a face-centered cubic lattice, a body-centered cubic lattice, or a close-packed hexagonal lattice, and cast-molding the obtained material, subjecting the cast-molded material to the solution treatment, and subjecting the said material to

the ageing treatment to make the crystallite thereof fine with the size in the level of nanometers (10^{-9} m to 10^{-6} m) ~~and micrometers (10^{-6} m to 10^{-3} m)~~ as the average crystallite diameters obtained by the Scherrer's equation based on an analysis by the X-ray analysis~~.~~,

wherein said metal alloy including a high-purity metal alloy contains a metal selected from the group consisting of gold (Au), silver (Ag), platinum (Pt), palladium (Pd), aluminum (Al), magnesium (Mg), copper (Cu), iron (Fe) and titanium (Ti).

~~3. The method according to claim 2, wherein said metal alloy is a metal alloy including a high-purity metal alloy whose crystal lattice is a face-centered cubic lattice.~~

~~4. The method according to claim 2, wherein said metal alloy including a high-purity metal alloy is a metal alloy including a high-purity metal alloy of a metal selected from the group consisting of gold (Au), silver (Ag), platinum (Pt), palladium (Pd), aluminum (Al), magnesium (Mg), copper (Cu), iron (Fe) and titanium (Ti).~~

5. The method according to ~~any one of~~ claims ~~2 to~~ 4, wherein said gadolinium (Gd) is gadolinium (Gd) solely or gadolinium (Gd) together with at least one element selected from the group consisting of elements other than gadolinium (Gd).

6. The method according to claim 4 or 5, wherein said cast-molding is vacuum casting.

~~6. The method according to any one of claims 2 to 5, wherein the method comprises the steps of:~~

~~cast-molding the material and~~

~~subjecting the said material to the solution treatment.~~

~~7. The method according to any one of claims 2 to 5, wherein the method comprises the steps of:~~

~~cast-molding the material,~~

~~subjecting the said material to the solution treatment, and~~

~~subjecting the material to the ageing treatment.~~

~~8~~7. The method according to any one of claims ~~2~~ 4 to ~~5~~6, wherein the method comprises the steps of:

~~cast-molding the material,~~

~~subjecting the said material to~~ after the solution treatment,

processing the material to a prescribed form, and

subjecting the material to the ageing treatment before and after the processing.

~~9~~8. The method according to claim ~~8~~7, wherein after the solution treatment, processing treatment and ageing treatment are conducted alternately and repeatedly.

~~10~~9. The method according to any one of claims ~~6~~ 4 to ~~9~~8, wherein the solution treatment is conducted by rapidly cooling the metal alloy after heating it in the temperature range of ~~200~~ 300 to 2800°C, and the ageing treatment is conducted by heat-treating the crystalline metal alloy in the temperature range of 100 to 1600°C.

~~11~~10. The method according to any one of claims ~~6~~ 4 to ~~9~~8, wherein ~~temperature of the solution treatment is in the range of 300 to 2800°C and~~ temperature of the ageing treatment is in the range of 100 to 1400°C.

~~12~~11. The method according to any one of claims ~~6~~ 4 to ~~9~~8, wherein temperature of the solution treatment is in the range of 300 to 2700°C and temperature of the ageing treatment is in the range of 50 to 1000°C.

~~13~~12. The method according to any one of claims ~~6~~ 4 to ~~9~~8, wherein temperature of the solution treatment is in the range of ~~250~~ 300 to 2500°C and temperature of the ageing treatment is in the range of 100 to 800°C.

~~14~~13. The fine crystallite high-function metal alloy member according to claim 1,

wherein the member is obtainable by the method according to any one of claims ~~2~~ 4 to ~~13~~12.

~~15~~14. A product with reduced size and weight, a musical instrument material, an electronic material, a jewelry material, a structural material, an automobile part or an aerial part, used the fine crystallite high-function metal alloy member according to claim ~~14~~13.