CLAIMS

[Claim 1] A tantalum sputtering target having a (200)-plane orientation ratio of 70% or less and a (222)-plane orientation ratio of 10% or more at the sputtering surface of the tantalum sputtering target.

[Claim 2] The tantalum sputtering target according to Claim 1, having a (200)-plane orientation ratio of 60% or less and a (222)-plane orientation ratio of 20% or more at the sputtering surface of the tantalum sputtering target.

[Claim 3] The tantalum sputtering target according to Claim 1, having a (200)-plane orientation ratio of 50% or less and a (222)-plane orientation ratio of 30% or more at the sputtering surface of the tantalum sputtering target.

[Claim 4] A thin film for a diffusion barrier layer formed using the sputtering target according to any one of Claims 1 to 3.

[Claim 5] A semiconductor device comprising the thin film for a diffusion barrier layer according to Claim 4.

[Claim 6] A method for manufacturing a tantalum sputtering target, the method comprising forging and recrystallization annealing a tantalum ingot obtained through melting and casting, and rolling and heat-treating the annealed ingot to form a crystal structure having a (200)-plane orientation ratio of 70% or less and a (222)-plane orientation ratio of 10% or more at the sputtering surface of the target.

[Claim 7] The method for manufacturing a tantalum sputtering target according to Claim 6, the method comprising forging and recrystallization annealing a tantalum ingot obtained through melting and casting, and rolling and heat-treating the annealed ingot to form a crystal structure having a (200)-plane orientation ratio of 60% or less and a (222)-plane orientation ratio of 20% or more at the sputtering surface of the target.

[Claim 8] The method for manufacturing a tantalum sputtering target according to Claim 6, the method comprising forging and recrystallization annealing a tantalum ingot obtained through melting and casting, and rolling and heat-treating the annealed ingot to form a crystal structure having a (200)-plane orientation ratio of 50% or less and a (222)-plane orientation ratio of 30% or more at the sputtering surface of the target.

[Claim 9] The method for manufacturing a tantalum sputtering target according to any one of Claims 6 to 8, wherein the rolling is performed by

cold rolling using a rolling roll having a diameter of 500 mm or more at a rolling speed of 10 m/min or more and a rolling ratio exceeding 80%.

[Claim 10] The method for manufacturing a tantalum sputtering target according to any one of Claims 6 to 8, wherein the rolling and the heat treatment are repeated at least twice, and the rolling is performed by cold rolling using a rolling roll having a diameter of 500 mm or more at a rolling speed of 10 m/min or more and a rolling ratio of 60% or more.

[Claim 11] The method for manufacturing a tantalum sputtering target according to any one of Claims 6 to 10, wherein the heat treatment is performed at a temperature of 900°C to 1400°C.

[Claim 12] The method for manufacturing a tantalum sputtering target according to any one of Claims 6 to 11, wherein the forging and recrystallization annealing are repeated at least twice.

[Claim 13] The method for manufacturing a tantalum sputtering target according to any one of Claims 6 to 12, the method further comprising surface finishing by cutting and polishing after the rolling and heat treatment.

CLAIMS

1. A tantalum sputtering target having a (200)-plane orientation ratio of ≥ 30% and ≤70% and a (222)-plane orientation ratio of 10% or more at the sputtering surface of the tantalum sputtering target.

2. The tantalum sputtering target according to claim 1, having a (200)-plane orientation ratio of 60% or less and a (222)-plane orientation ratio of 20% or more at the sputtering surface of the tantalum sputtering target.

3. The tantalum sputtering target according to claim 1, having a (200)-plane orientation ratio of 50% or less and a (222)-plane orientation ratio of 30% or more at the sputtering surface of the tantalum sputtering target.

4. A method for manufacturing a tantalum sputtering target, the method comprising:

forging and recrystallization annealing a tantalum ingot obtained through melting and casting at a temperature of 1100 to 1400°C;
cold rolling using a rolling roll having a diameter of 500 mm or more at a rolling speed of 10 m/min or more; and heat-treating the annealed ingot at a temperature of 900°C to 1400°C to form a crystal structure having a (200)-plane orientation ratio of ≥ 30% and ≤70% and a (222)-plane orientation ratio of 10% or more at the sputtering surface of the target.

5. The method for manufacturing a tantalum sputtering target according to claim 4, wherein the rolling ratio in one pass is 8 to 12%.

6. The method for manufacturing a tantalum sputtering target according to claim 4 or 5, wherein the forging and recrystallization annealing are performed at least twice.

7. The method for manufacturing a tantalum sputtering target according to any one of claims 4 to 6, wherein the rolling ratio exceeds 80%.

8. The method for manufacturing a tantalum sputtering target according to any one of claims 4 to 6, wherein the rolling ratio is 60% or more.

9. The method for manufacturing a tantalum sputtering target according to any one of claims 4 to 8, further comprising:

surface finishing by cutting and polishing after the rolling and heat treatment.