CLAIMS

1. A bonding wire for a semiconductor device, the bonding wire comprising:

a Cu alloy core material; and

a Pd coating layer formed on a surface of the Cu alloy core material, wherein

the bonding wire contains at least one element selected from Ni, Zn, Rh, In, Ir, and Pt,

a concentration of the elements in total relative to the entire wire is 0.03 to 2% by mass,

when measuring crystal orientations on a cross-section of the core material in a direction perpendicular to a wire axis of the bonding wire, a crystal orientation <100> angled at 15 degrees or less to a wire longitudinal direction has a proportion of 50% or more among crystal orientations in the wire longitudinal direction, and

an average crystal grain size in the cross-section of the core material in the direction perpendicular to the wire axis of the bonding wire is 0.9 to 1.3 μm.

2. The bonding wire for a semiconductor device according to claim 1, wherein a strength ratio defined by the following Equation (1) is 1.1 to 1.6:

Strength ratio = ultimate strength/0.2% offset yield strength. (1)

3. The bonding wire for a semiconductor device according to claim 1 or 2, wherein a thickness of the Pd coating layer is 0.015 to 0.150 μm.

4. The bonding wire for a semiconductor device according to any one of claims 1 to 3, further comprising an alloy

skin layer containing Au and Pd on the Pd coating layer.

5. The bonding wire for a semiconductor device according to claim 4, wherein a thickness of the alloy skin layer containing Au and Pd is 0.0005 to 0.050 μm.

6. The bonding wire for a semiconductor device according to any one of claims 1 to 5, wherein

the bonding wire contains at least one element selected from Ga, Ge, As, Te, Sn, Sb, Bi, and Se,

a concentration of the at least one element in total relative to the entire wire is 0.1 to 100 ppm by mass, and

Sn ≤ 10 ppm by mass; Sb ≤ 10 ppm by mass; and Bi ≤ 1 ppm by mass.

7. The bonding wire for a semiconductor device according to any one of claims 1 to 6, wherein

the bonding wire further contains at least one element selected from B, P, Mg, Ca, and La, and

a concentration of each of the at least one element relative to the entire wire is 1 to 100 ppm by mass.

8. The bonding wire for a semiconductor device according to any one of claims 1 to 7, wherein Cu is present on an outermost surface of the bonding wire.

CLAIMS

1. A bonding wire for a semiconductor device, the bonding wire comprising:

a Cu alloy core material; and

a Pd coating layer formed on a surface of the Cu alloy core material, wherein

the bonding wire contains at least one element selected from Ni, Zn, Rh, In, Ir, and Pt,

a concentration of the elements in total relative to the entire wire is 0.03% by mass or more and 2% by mass or less,

when measuring crystal orientations on a cross-section of the core material in a direction perpendicular to a wire axis of the bonding wire, a crystal orientation <100> angled at 15 degrees or less to a wire axis direction has a proportion of 50% or more among crystal orientations in the wire axis direction, and

an average crystal grain size in the cross-section of the core material in the direction perpendicular to the wire axis of the bonding wire is 0.9 μm or more and 1.3 μm or less.

2. The bonding wire for a semiconductor device according to claim 1, wherein a yield strength ratio defined by the following Equation (1) is 1.1 or more and 1.6 or less:

Yield strength ratio = maximum yield strength/0.2% yield strength. (1)

3. The bonding wire for a semiconductor device according to claim 1 or 2, wherein a thickness of the Pd coating layer is 0.015 μm or more and 0.150 μm or less.

4. The bonding wire for a semiconductor device according to any one of claims 1 to 3, further comprising an alloy skin layer containing Au and Pd on the Pd coating layer.

5. The bonding wire for a semiconductor device according to claim 4, wherein a thickness of the alloy skin layer containing Au and Pd is 0.0005 μm or more and 0.050 μm or less.

6. The bonding wire for a semiconductor device according to any one of claims 1 to 5, wherein

the bonding wire contains at least one element selected from Ga, Ge, As, Te, Sn, Sb, Bi, and Se,

a concentration of the at least one element in total relative to the entire wire is 0.1 ppm by mass or more and 100 ppm by mass or less, and

Sn ≤ 10 ppm by mass; Sb ≤ 10 ppm by mass; and Bi ≤ 1 ppm by mass.

7. The bonding wire for a semiconductor device according to any one of claims 1 to 6, wherein

the bonding wire further contains at least one element selected from B, P, Mg, Ca, and La, and

a concentration of each of the at least one element relative to the entire wire is 1 ppm by mass or more and 100 ppm by mass or less.

8. The bonding wire for a semiconductor device according to any one of claims 1 to 7, wherein Cu is present on an outermost surface of the bonding wire.