CLAIMS

1. A bonding wire for semiconductor devices, the bonding wire comprising:

a core member formed of an electrically-conductive metal; and

a skin layer formed on the core member and mainly composed of a different metal from the core member, and wherein

a main constituent of the core member is any one kind of followings: Cu; and Au,

the core member further contains greater than or equal to one kind of followings: B; Pd; Bi; P; and Zr,

the metal of the skin layer is a face-centered cubic metal,

a thickness of the skin layer is within a range from 0.005 to 0.2 μm, and

a percentage of <111> orientations in crystalline orientations <hkl> in a wire lengthwise direction at a crystal face of a surface of the skin layer is greater than or equal to 50 %, said <111> orientations including crystalline orientations having an angular difference relative to the wire lengthwise direction, said angular difference being within 15 degrees, and

a ratio of an average size of a crystal grain at the surface of the skin layer in the wire lengthwise direction relative to an average size of the crystal grain at the surface of the skin layer in the circumferential direction is greater than or equal to three.

2. The semiconductor-device bonding wire according to claim 1, wherein a total percentage of <111> orientation and <100> orientation in the crystalline orientations <hkl> in the wire lengthwise direction at a crystal

face of a cross section of the core member is greater than or equal to 15 %.

3. The semiconductor-device bonding wire according to claim 1 or 2, wherein a main constituent of the skin layer is any one kind of followings: Pd; Pt; Ru; and Ag.

4. The semiconductor-device bonding wire according to any one of claims 1 to 3, further comprising an intermediate metal layer formed between the skin layer and the core member and composed of a different constituent from the main constituent of the skin layer and the main constituent of the core member.

5. The semiconductor-device bonding wire according to any one of claims 1 to 4, further comprising a diffusion layer formed between the skin layer and the core member and having a concentration gradient of the main constituent of the skin layer and the core member.

6. The semiconductor-device bonding wire according to any one of claims 1 to 5, wherein the main constituent of the core member is Cu and a total percentage of <111> orientations and <100> orientations in the crystalline orientations <hkl> in the wire lengthwise direction at the crystal face of the surface of the skin layer is greater than or equal to 60 %.

7. The semiconductor-device bonding wire according to any one of claims 3 to 5, wherein the main constituent of the core member is Cu and the core member contains greater than or equal to one kind of followings: B; Pd; Bi; P; and Zr at a concentration within a range from 5 to 300 ppm in total.

8. The semiconductor-device bonding wire according to any one of claims 3 to 5, wherein

the main constituent of the core member is Cu and the core member contains Pd at a concentration within a range from 5 to 10000 ppm, and

the main constituent of the skin layer is Pd or Ag.

9. The semiconductor-device bonding wire according to any one of claims 3 to 5, wherein the main constituent of the core member is Au and the core member contains greater than or equal to one kind of followings: Be; Ca; Ni; Pd and Pt at a concentration within a range from 5 to 8000 ppm in total.

Claims

1. A bonding wire for semiconductor devices, the bonding wire comprising:

a core member formed of an electrically-conductive metal; and

a skin layer formed on the core member and mainly composed of a metal different from the core member, and wherein

the metal of the skin layer is a face-centered cubic metal,

a thickness of the skin layer is within a range from 0.005 to 0.09 μm,

an orientation ratio of <111> orientations in crystalline orientations <hkl> in a wire lengthwise direction at a crystal face of a surface of the skin layer is greater than or equal to 50 %, and

said <111> orientations have an angular difference relative to the wire lengthwise direction, said angular difference being within 15 degrees.

2. The semiconductor-device bonding wire according to claim 1, further comprising a diffusion layer formed between the skin layer and the core member and having a concentration gradient of main constituents of the skin layer and the core member.

3. The semiconductor-device bonding wire according to claim 1 or 2, wherein a main constituent of the skin layer is any one of Pd, Pt, Ru and Ag.

4. The semiconductor-device bonding wire according to any one of claims 1 to 3, wherein a main constituent of the core member is any one of Cu and Au.

5. The semiconductor-device bonding wire according to claim 3 or 4, wherein the main constituent of the core member is Cu and the core member contains at least one of B, Pd, Bi, P and Zr at a concentration within a range from 5 to 300 ppm in total.

6. The semiconductor-device bonding wire according to claim 3 or 4, wherein the main constituent of the core member is Cu and the core member contains Pd at a concentration within a range from 5 to 10000 ppm, and the main constituent of the skin layer is Pd or Ag.

7. The semiconductor-device bonding wire according to claim 3 or 4, wherein the main constituent of the core member is Au and the core member contains at least one of Be, Ca, Ni, Pd and Pt at a concentration within a range from 5 to 8000 ppm in total.