

CLAIMS

1. A copper alloy bonding wire for semiconductor devices, comprising in total 0.05% by mass or more to 3% by mass or less of at least one or more kinds of first elements
5 selected from Ni, Zn, Ga, Ge, In, and Ir, wherein the copper alloy bonding wire comprises 0.0001% by mass or more and 0.050% by mass or less of each of at least one or more kinds of elements selected from P, and Mg, with the balance comprising Cu and inevitable impurities, and
10 the copper alloy bonding wire is bare Cu alloy wire.
2. A copper alloy bonding wire for semiconductor devices, comprising in total 0.05% by mass or more to 3% by mass or less of at least one or more kinds of first elements
15 selected from Ni, Zn, Ga, Ge, In, and Ir, wherein the copper alloy bonding wire comprises in total 0.03% by mass or more of each of at least one or more kinds of elements selected from Rh, and Pt, total concentration of the elements and the first elements is 3% by mass or less, with
20 the balance comprising Cu and inevitable impurities, and the copper alloy bonding wire is bare Cu alloy wire.
3. The copper alloy bonding wire for semiconductor devices according to claim 2, wherein the copper alloy
25 bonding wire further comprises 0.0001% by mass or more and 0.050% by mass or less of each of at least one or more kinds of elements selected from Ti, B, P, Mg, Ca, La, As, Te, and Se, with respect to the entire wire.
- 30 4. The copper alloy bonding wire for semiconductor devices according to any one of claims 1 to 3, wherein an average crystal grain size (μm) in core cross section in a direction vertical to a wire axis of the copper alloy

bonding wire is

$$0.02 \times R + 0.4 \text{ or more} \quad (1a)$$

$$0.1 \times R + 0.5 \text{ or less} \quad (1b)$$

where R (μm) is a diameter of the wire.

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5. The copper alloy bonding wire for semiconductor devices according to any one of claims 1 to 4, wherein an average film thickness of copper oxide on a surface of the wire is in a range of 0.0005 μm or more and 0.02 μm or less.

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6. The copper alloy bonding wire for semiconductor devices according to any one of claims 1 to 5, wherein the copper alloy bonding wire further comprises in total 0.0005% by mass or more and 0.5% by mass or less of at least one or more kinds of elements selected from Ag and Au, with respect to the entire wire.

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7. The copper alloy bonding wire for semiconductor devices according to any one of claims 1 to 6, wherein the copper alloy bonding wire further comprises 1.15% by mass or less of Pd.

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8. The copper alloy bonding wire for semiconductor devices according to any one of claims 1 to 7, wherein the copper alloy bonding wire comprises two or more kinds of first elements selected from Ni, Zn, Ga, Ge, In, and Ir.

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