

[Document Name] CLAIMS

[Claim 1]

A noble metal-coated copper wire for ball bonding, the wire having a wire diameter of 10 μm or more and 25 μm or less, and comprising a core material comprising a copper alloy having a copper (Cu) purity of 98 mass% or higher, and a noble metal-coating layer formed on the core material;

wherein the noble metal-coating layer comprises:

a palladium (Pd) cavitating layer in which at least one or two or more contained elements selected from Group 13 to 16 elements and oxygen elements are finely dispersed; and

a diffusion layer of palladium (Pd) and copper (Cu).

[Claim 2]

A noble metal-coated copper wire for ball bonding, the wire having a wire diameter of 10 μm or more and 25 μm or less, and comprising a core material comprising a copper alloy having a copper (Cu) purity of 98 mass% or higher, and a noble metal-coating layer formed on the core material;

wherein the noble metal-coating layer comprises:

a gold (Au) ultra-thin stretched layer;

a palladium (Pd) cavitating layer in which at least one or two or more contained elements selected from Group 13 to 16 elements and oxygen elements are finely dispersed; and

a diffusion layer of palladium (Pd) and copper (Cu).

[Claim 3]

A noble metal-coated copper wire for ball bonding, the wire having a wire diameter of 10 μm or more and 25 μm or less, and comprising a core material comprising a copper alloy having a copper (Cu) purity of 98 mass% or higher, and a noble metal-coating layer formed on the core material;

wherein the noble metal-coating layer comprises a palladium (Pd) cavitating layer in which at least one or two or more contained elements selected from Group 13 to 16 elements and oxygen elements are finely dispersed; and

wherein a nickel (Ni) intermediate layer is present between the core material and the noble metal-coating layer.

[Claim 4]

A noble metal-coated copper wire for ball bonding, the wire having a wire diameter of 10 μm or more and 25 μm or less, and comprising a core material comprising a copper alloy having a copper (Cu) purity of 98 mass% or higher, and a noble metal-coating layer formed on the core material;

wherein the noble metal-coating layer comprises a gold (Au) ultra-thin stretched layer, and a palladium (Pd) cavitating layer in which at least one or two or more contained elements selected from Group 13 to 16 elements and oxygen elements are finely dispersed; and

wherein a nickel (Ni) intermediate layer is present between the core material and the noble metal-coating layer.

[Claim 5]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the at least one or two or more contained elements comprise one or two or more elements selected from sulfur (S), carbon (C), phosphorus (P), boron (B), silicon (Si), germanium (Ge), arsenic (As), selenium (Se), indium (In), tin (Sn), antimony (Sb), tellurium (Te), bismuth (Bi), and oxides thereof.

[Claim 6]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the at least one or two or more contained elements comprise one or two or more elements selected from sulfur (S), phosphorus (P), selenium (Se), tellurium (Te), and oxygen elements.

[Claim 7]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the at least one or two or more contained elements comprise sulfur (S).

[Claim 8]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the at least one or two or more contained elements comprise carbon (C).

[Claim 9]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the noble metal-coating layer has a theoretical film thickness of 20 nanometers (nm) or more and 300 nanometers (nm) or less.
[Claim 10]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein oxygen elements are detected on the surface of the noble metal-coating layer.
[Claim 11]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein copper (Cu) is detected on the surface of the noble metal-coating layer.
[Claim 12]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the core material is a copper alloy containing 0.003 mass% or more and 0.2 mass% or less of phosphorus (P).
[Claim 13]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the core material is a copper alloy containing at least one or two or more members selected from platinum (Pt), palladium (Pd), and nickel (Ni) in a total amount of 0.1 mass% or more and 2 mass% or less.
[Claim 14]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the core material is a copper alloy containing 0.1 mass ppm or more and 10 mass ppm or less of hydrogen.
[Claim 15]

The noble metal-coated copper wire for ball bonding according to any one of claims 1 to 4, wherein the palladium (Pd) cavitating layer is a stretched wet plating layer.