CLAIMS

1. A wire comprising a core comprising or consisting of
(a) nickel in an amount in the range of from 0.005 to 5 wt.-%,
(b) optionally, silver in an amount in the range of from 0.005 to 1 wt.-%,
(c) copper in an amount in the range of from 94 wt.-% to 99.98 wt.-%, and
(d) 0 to 100 wt.-ppm of further components,
wherein all amounts in wt.-% and wt.-ppm are based on the total weight of the core,
wherein the core has an average size of crystal grains in the range of from 1.5 to 30 µm, the average size determined according to the line intercept method,
wherein the wire has an average diameter in the range of from 8 to 80 µm.

2. The wire of claim 1,
wherein
the average diameter is in the range of from 12 to 55 µm.

3. The wire of claim 1 or 2,
wherein
the core has a surface which is an outer surface or wherein a coating layer is superimposed over the surface of the core.

4. The wire of claim 3,
wherein
the mass of the coating layer is not more than 2.5 wt.-%, with respect to the total mass of the core.

5. The wire of claim 3 or 4,
wherein
the coating layer is a monolayer of palladium, platinum or silver or a multilayer of a number of super-positioned adjacent layers, each layer being made of one element selected from the group consisting of palladium, platinum and silver.

6. The wire of claim 3, 4 or 5,
wherein
a further coating layer is superimposed over the coating layer.

7. The wire of claim 6,
wherein
the further coating layer is a gold layer.

8. The wire of any one of the preceding claims,
wherein
the wire core comprises elemental phosphorus as a dopant in an amount in the range of from 40 to 80 wt.-ppm, based on the total weight of the core.

9. The wire of any one of the preceding claims,
wherein
the ratio between the diameter of the core and the average size of crystal grains in the core is in the range of from 2 to 14.

10. The wire of any one of the preceding claims,
characterized at least by one of the following features:

α) The corrosion resistance has a value of at most 0% bonded ball lift;

β) The moisture resistance has a value of at most 0% bonded ball lift;

γ) The hardness of the wire core is not more than 120 HV;

δ) The process window area for stitch bonding has a value of at least 40 µm·g, provided the wire has an average diameter of 18 µm;

ϵ) The resistivity of the wire is not more than 1.80 µΩ·cm;

ζ) The average bonded ball roundness has a value of at most 0.0025 µm, provided the wire has an average diameter of 18 µm;

η) The average bonded ball concentricity has a value of at most 0.00056 µm, provided the wire has an average diameter of 18 µm.

11. A process for the manufacture of a wire of any one of the preceding claims, the process comprising at least the process steps of

(1) providing a precursor item comprising or consisting of:

(a) nickel in an amount in the range of from 0.005 to 5 wt.-%,

(b) optionally, silver in an amount in the range of from 0.005 to 1 wt.-%,

(c) copper in an amount in the range of from 94 to 99.98 wt.-%, and

(d) 0 to 100 wt.-ppm of further components,

wherein all amounts in wt.-% and wt.-ppm are based on the total weight of the precursor item,

(2) elongating the precursor item to form a wire precursor, until the desired diameter of the wire core is obtained; and

(3) annealing the elongated wire precursor obtained after completion of process step (2).

12. The process of claim 11,
wherein
the annealing is strand annealing.

13. The process of claim 11 or 12,
wherein
the annealing is performed at an object temperature in the range of 440 to 700 °C for 0.1 to 0.4 seconds.

14. The process of claim 11, 12 or 13,
wherein
the annealing is performed at a temperature above the temperature of maximum elongation wherein the elongation value of the wire after annealing is not more than 98% of the maximum elongation value.

15. The process of any one of claims 11 to 14,
wherein
the annealing is performed in an inert or reducing atmosphere.

CLAIMS

1. A wire comprising a core comprising or consisting of:
(a) nickel in an amount in the range of from 0.005 to 5 wt.-%,
(b) copper in an amount in the range of from 94 wt.-% to 99.98 wt.-%, and
(c) 0 to 100 wt.-ppm of further components,
wherein all amounts in wt.-% and wt.-ppm are based on the total weight of the core;
wherein the core has an average size of crystal grains in the range of from 1.5 to 30 µm, the average size determined according to the line intercept method;
wherein the wire has an average diameter in the range of from 8 to 80 µm;
wherein a coating layer is superimposed over the surface of the core;
wherein a further coating layer is superimposed over the coating layer; and
wherein the further coating layer is a gold layer.

2. The wire as claimed in claim 1, wherein the core further comprises silver in an amount in the range of from 0.005 to 1 wt.-%,

3. The wire as claimed in claim 1 or claim 2, wherein the average diameter is in the range of from 12 to 55 µm.

4. The wire as claimed in claim 1 or claim 2, wherein the mass of the coating layer is not more than 2.5 wt.-%, with respect to the total mass of the core.

5. The wire as claimed in any one of claims 1, 2, or 4 wherein the coating layer is a monolayer of palladium, platinum or silver or a multilayer of a number of super-positioned adjacent layers, each layer being made of one element selected from the group consisting of palladium, platinum and silver.

6. The wire as claimed in any one of the preceding claims, wherein the wire core comprises elemental phosphorus as a dopant in an amount in the range of from 40 to 80 wt.-ppm, based on the total weight of the core.

7. The wire as claimed in any one of the preceding claims, wherein the ratio between the diameter of the core and the average size of crystal grains in the core is in the range of from 2 to 14.

8. The wire as claimed in any one of the preceding claims, wherein the wire has at least one of the following features:
   α) The corrosion resistance has a value of at most 0% bonded ball lift;
   β) The moisture resistance has a value of at most 0% bonded ball lift;
   γ) The hardness of the wire core is not more than 120 HV;
   δ) The process window area for stitch bonding has a value of at least 40 µm·g, provided the wire has an average diameter of 18 µm;
   ε) The resistivity of the wire is not more than 1.80 µΩ·cm;
   ζ) The average bonded ball roundness has a value of at most 0.0025 µm, provided the wire has an average diameter of 18 µm;
   η) The average bonded ball concentricity has a value of at most 0.00056 µm, provided the wire has an average diameter of 18 µm.

9. A process for the manufacture of a wire as claimed in any one of the preceding claims, the process comprising at least the process steps of
   (1) providing a precursor item comprising or consisting of:
      (a) nickel in an amount in the range of from 0.005 to 5 wt.-%,
      (b) optionally, silver in an amount in the range of from 0.005 to 1 wt.-%,
      (c) copper in an amount in the range of from 94 to 99.98 wt.-%, and
      (d) 0 to 100 wt.-ppm of further components,
   wherein all amounts in wt.-% and wt.-ppm are based on the total weight of the precursor item,
   (2) elongating the precursor item to form a wire precursor, until the desired diameter of the wire core is obtained; and
   (3) annealing the elongated wire precursor obtained after completion of process step (2).

10. The process as claimed in claim 9, wherein the annealing is strand annealing.

11. The process as claimed in claim 9 or claim 10, wherein the annealing is performed at an object temperature in the range of 440 to 700 °C for 0.1 to 0.4 seconds.

12. The process as claimed in any one of claims 9-11, wherein the annealing is performed at a temperature above the temperature of maximum elongation wherein an elongation value of the wire after annealing is not more than 98% of the maximum elongation value.

13. The process as claimed in claim 11 or claim 12, wherein the annealing is performed in an inert or reducing atmosphere.