CLAIMS

1. An alloyed silver wire comprising or consisting of a wire core, the wire core itself consisting of:

(a) palladium in an amount in the range of from 0.1 to 3 wt.-%,

(b) gold in an amount in the range of from 0.1 to 3 wt.-%,

(c) nickel in an amount in the range of from 20 to 700 wt.-ppm,

(d) calcium in an amount in the range of from 20 to 200 wt.-ppm,

(e) silver in an amount in the range of from 93.91 to 99.786 wt.-%, and

(f) 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 alloyed silver wire has an average diameter in the range of from 8 to 80 µm.

2. The alloyed silver wire of claim 1 having an average diameter in the range of from 12 to 55 µm.

3. The alloyed silver wire of claim 1 or 2, wherein the palladium amount is in the range of from 0.5 to 1.5 wt.-%.

4. The alloyed silver wire of any one of the preceding claims, wherein the gold amount is in the range of from 0.2 to 1.5 wt.-%.

5. The alloyed silver wire of any one of the preceding claims, wherein the nickel amount is in the range of from 275 to 325 wt.-ppm.

6. The alloyed silver wire of any one of the preceding claims, wherein the calcium amount is in the range of from 20 to 50 wt.-ppm.

7. The alloyed silver wire of any one of the preceding claims, wherein the silver amount is in the range of from 96.9625 to 99.2595 wt.-%.

8. The alloyed silver wire of any one of the preceding claims having a round, ellipsoid or rectangular shape, in cross-sectional view.

9. The alloyed silver wire of any one of the preceding claims wherein the wire core has a surface, wherein the surface is an outer surface or an interface region between the wire core and a coating layer superimposed on the wire core.

10. The alloyed silver wire of claim 9 having a coating layer superimposed on the wire core, wherein the coating layer is a single-layer made of a precious metal element or a multi-layer comprised of a number of super-positioned adjacent sub-layers, wherein each sub-layer is made of a different precious metal element.

11. The alloyed silver wire of any one of the preceding claims wherein the wire core is characterized at least by one of the following intrinsic properties:
(1) The average wire grain size is less than 10 µm,
(2) The wire grain [100] or [101] or [111] plane of orientation is less than 7 %,
(3) The wire twin boundary fraction is less than 60 %,
(4) The FAB exhibits columnar grains,
(5) The FAB average grain size is ≤18 µm,
(6) The FAB grain [101] plane of orientation is less than 45 %,
(7) The FAB twin boundary fraction is less than 70 %,
and/or at least by one of the following extrinsic properties:
(α) The corrosion resistance has a value of not more than 5 % bonded ball lift,
(β) The moisture resistance has a value of not more than 5 % bonded ball lift,
(γ) The hardness of the wire core is not more than 85 HV,
(δ) The process window area for stitch bonding has a value of at least 12000 mA·g,
(ϵ) The resistivity of the wire is less than 2.5 µΩ·cm,
(ζ) The yield strength of the wire is not more than 170 MPa,
(η) The wire's silver dendritic growth is not more than 4 µm/s.

12. A process for the manufacture of an alloyed silver wire of any one of the preceding claims, wherein the process comprises at least the steps:

(1) providing a precursor item with the composition of the wire core of any one of claims 1 to 7,
(2) elongating the precursor item to form a wire precursor, until the desired final diameter of the wire core is obtained; and
(3) finally strand annealing the wire precursor obtained after completion of process step (2) at an oven set temperature in the range of from 400 to 600 °C for an exposure time in the range of from 0.4 to 0.8 seconds to form the alloyed silver wire,
wherein step (2) includes one or more sub-steps of intermediate batch annealing of the elongated precursor item at an oven set temperature of from 400 to 800 °C for an exposure time in the range of from 50 to 150 minutes and/or one or more sub-steps of intermediate strand annealing of the elongated precursor item at an oven set temperature of from 400 to 800 °C for an exposure time in the range of from 0.4 seconds to 1.2 seconds.

13. The process of claim 12, wherein the final strand annealing is performed at an oven set temperature in the range of 400 to 500 °C for an exposure time in the range of from 0.5 to 0.7 seconds.

14. The process of claim 12 or 13, wherein the finally strand annealed alloyed silver wire is quenched in water which may contain one or more additives.

15. The process of any one of claims 12 to 14, wherein the intermediate annealing of process step (2) as well as the final strand annealing of process step (3) is performed in an inert or reducing atmosphere.