Ammonia Odour Free and Ammonia

Technology Overview

Conventional PdNi alloy deposition solution contains high amount of ammonia (> 50 ml/L) and ammonia salt as complexing agents in the formulations. To migitate the risk of high volatile, pungent ammonia that evaporate into the working environment, additional safety infrastructure is required.

Conventional PdNi alloy deposition solution also requires high amount of palladium (25g/L) to achieve the desirable PdNi alloy (Pd80Ni20 in wt%) deposits @ current density 80 ASD. The high amount of Pd increases the manufacturing cost as well as costs for disposal/recovery.

With the developed **ammonia odour free** PdNi alloy deposition solution by SP, the key features/advantages are:

1) Reducing the use of ammonia and ammonia-based chemicals by replacing portion of these key components in conventional solutions by the use of other suitable complexers, resulting in ammonia odour free.
2) Achieve the same PdNi alloy (Pd80Ni20 in wt%) deposits @ current density 80 ASD with lower initial Pd concentrations, hence reducing palladium consumption, manufacturing and disposal cost.

Technology Features & Specifications

1) Halogen/ammonia odour free and low in ammonia (10% - 20% lower);
2) Require lesser palladium concentration (16 g/L) with nickel concentration (25 g/L) to achieve the PdNi alloy (Pd80Ni20 in wt%) deposits @ current density 80 ASD, reducing palladium consumption (reduced up to 9 g/L) and manufacturing cost;
3) Operating temperature: 40°C - 50°C
4) Operating pH: 7-7.35
5) Under current density 80 ASD, could achieve the 0.76 µm thickness of PdNi deposits within 3 seconds;
6) Time to deposit 1 µm at 10 ASD about 30 seconds;
7) Applicable to the wide range of operational current density from 20-120 ASD without burn and is applicable to both Direct Current (DC) and Pulse deposition;
8) Having uniform and dense deposit according to SEM images;
9) Hardness value of the deposits in the range of 550-620 mHv10 for current density 20-120 ASD;
10) Composition of deposits: 77% (wt) Pd ± 3%

Benefits

- Reduced precious metal consumption (lesser 9 g/L corresponding to USD 560/L)
- Applicable to wide range of operational current density without burn. Can use high ASD to shorten the operation time and increase the productivity
- Low porosity and denser deposit. Enhanced performance in term of morphology, hardness and corrosion resistance.

Potential Application

Electronic components (eg. Connector)

Commercialisation / R&D Opportunities

✓ Available for licensing
✓ Accepting business plans from interested parties

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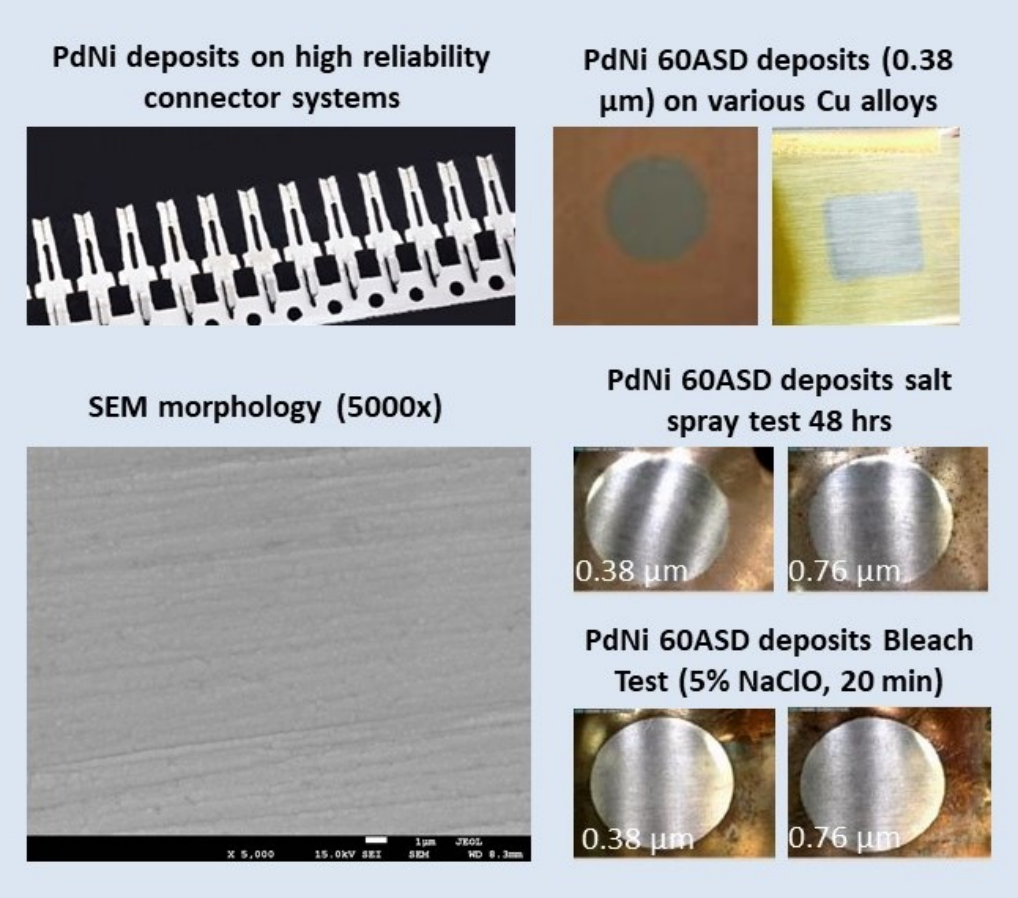
11) Low porosity and enhanced corrosion resistance (up to 48 hrs) from neutral salt spray test;
12) Small grain size 8nm - 13.5nm from the deposits (denser) which enhance the performance (morphology, hardness and corrosion resistance etc.) thus thinner PdNi deposits required.



Market Trends & Opportunities

Smaller and tighter configuration of electronic components and the miniaturization results in more challenging packaging requirements as well as cost reduction pressure faced by manufacturers required decreased coating thickness for precious metal but maintain similar performance (morphology, hardness and corrosion resistance etc.)

The market size for connector is foresee to be at least 70 billion with annual grow rate of 4%:
https://www.ttiinc.com/content/ttiinc/en/resources/marketeye/categories/connectors/me-bishop-20190313.html

This technology will be useful for the electronic components (e.g. connectors) which is miniaturized through the years as less consumption of precious metal (palladium) and thinner deposit with maintainable performance.

Disclaimer

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