

Nickel-Free Option for Electrical Contact Plating Stack Using a Nano-Crystalline Silver Alloy

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Abstract— There is an increased interest in eliminating nickel from all wearable/personal electronics surfaces to prevent contact dermatitis and other allergic reactions caused by nickel. This paper presents a new metal finish for contact surfaces based on a unique nano-crystalline silver alloy (NCSA) that eliminates the need for a nickel barrier layer. The performance of the NCSA-based finish is evaluated using standard industry qualification tests commonly associated with high reliability electronic connectors, including durability, mixed flowing gas, neutral salt spray, heat & humidity, and immersion corrosion. Preliminary results show that the NCSA stack, without the use of a nickel barrier layer, can provide equivalent or better durability and corrosion resistance when compared to an industry standard gold/nickel-sulfamate stack, while also acting as a diffusion barrier for Cu thus preserving its electrical performance as a final finish. In contrast with traditional silver coatings, the NCSA is thermally stable, maintaining its nano-crystalline grain structure and durability performance. The new NCSA stack contact finish shows positive performance in this initial testing suite, and represents a promising new nickel-free option for wearable electronic device electrical contact surfaces.

Keywords—*Silver; nano-crystalline; nickel-free; connector; gold alternative; immersion corrosion*