



Technology Readiness Level: **3**
Analytical and Experimental Critical Function
And/or Characteristic Proof of Concept

Room Temperature, Non-Toxic Aluminum Electrodeposition

Eltron Research has developed a room temperature, non-toxic process for the application of protective, highly dense aluminum coatings.

Plating processes that impart corrosion resistance are needed to replace processes that use highly toxic materials such as cadmium. One possible process would be electrodeposition of aluminum films, which perform well in corrosion tests. Currently used aluminum electrodeposition processes require pyrophoric alkylaluminum precursors dissolved in toluene. With the current process there is a need for deposition of dense, non-porous aluminum films on hardware components without alkylaluminum precursors and solvents, which can release volatile organic carbons.

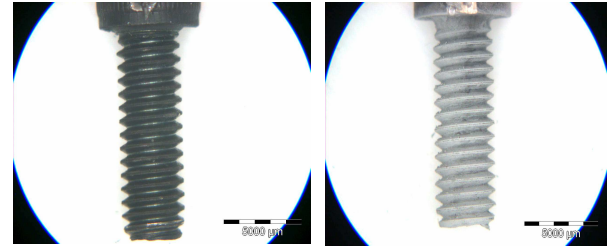


Figure 1: Left: Uncoated bolt. Right: Same bolt coated using Eltron's AlN CVD process.

Eltron's Solution

Eltron Research & Development has demonstrated the proof of concept for a room-temperature, non-toxic process for the application of protective, highly dense aluminum coatings.

The technology represents development of the first commercial, affordable, ambient-temperature molten salt plating process. Eltron's electrodeposition technology is the first step toward reducing the environmental impact of Al electroplating, which relies heavily on solvents that cause VOC emissions. Eliminating organic solvent use is a significant, environmentally advantageous feature of the ionic liquid technology.

Aluminum electroplating is performed mostly from aluminum-containing organic baths or from high temperature molten salts. The Siemens Sigal[®] process, which dominates the market, involves electroplating from an alkyl aluminum fluoride in toluene and operates at 100°C with pyrophoric alkyl aluminum compounds and toluene, a highly flammable organic solvent. The ambient temperature molten salt process developed by Eltron enables high-quality aluminum electroplating at reduced, safer, temperature, and eliminates the use of organic cosolvents.

Aluminum electroplating provides excellent corrosion protection and can be used in applications where components are exposed to high temperatures. Commercial applications include protection of hardened steel aerospace components such as landing gear, fasteners, and engine mounts, as well as aluminum alloy aerospace components such as electrical connectors.

Stage of Development

The United States Navy has expressed interest in this technology based on the proof-of-concept Eltron has provided.

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To discuss the possibility of entering into a business relationship with Eltron, contact the Business Development Group at business@eltronresearch.com.



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