Materials & Chemicals

# Additive-Free Method of Zinc Electrodeposition

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**WiSys is seeking a strategic partner in the metal plating industry who can provide a route to market for the commercialization, scale-up, and use of this additive-free method for zinc electrodeposition.**

## Overview

The need for corrosion-resistant materials is present throughout automotive, aerospace, and electronics manufacturing as well as many other metal and polymer manufacturing industries. Electrodeposition (or electroplating) is a common technique used by the metal finishing industry to protect metals such as steel from corrosion. In this process, the steel is submerged into a bath of an electrolyte solution which contains ions of the corrosion-resistant metal. Then, an electrical current is used to plate a thin layer of the corrosion-resistant metal onto the surface of the steel. Often, the electrolyte solution also contains additives to promote even coating. These additives increase the costs and complexity of the electrodeposition process and produce undesirable waste products. Furthermore, the adherence to stricter environmental regulations has forced the metal finishing industry to adopt processes without the use of harmful chemical additives. Zinc is one of the most common electroplating chemicals according to a Markets and Markets report. The widespread use of zinc electrodeposition is due to its excellent corrosion resistance; however, the zinc electrodeposition process does require the use of harmful additives. Therefore, there is a need for an additive-free electrodeposition method that results in corrosion resistance.

## The Invention

Researchers from the University of Wisconsin – La Crosse have developed a novel method for electroplating zinc that is additive-free and provides corrosion resistance to the material. The method uses pulsed electrical signals within the zinc electrolyte bath to affect the grain size, morphology, and crystal orientation of the zinc crystals on low-carbon steel materials. Tuning the current density and the duty cycle during the electrodeposition process shows promising changes in the corrosion resistance of the samples. The zinc coating is produced without additives in the electrolyte bath. This reduces the overall cost and reduces hazardous waste without necessitating major changes to existing electrodeposition operations.

## Applications

Provides a corrosion-resistant coating to metals including low-carbon steel

## Key Benefits

- Eliminates the use in additives and additive byproducts that are common in zinc electrodeposition
- Easily introduced into an existing electrodeposition operations
- Uniform zinc deposit layer
- Tunable zinc coating thickness

## Stage of Development

Optimization of this novel method is ongoing, as well as continued testing of the corrosion resistance properties.

**Tech Fields**

- Clean Technology : Other clean technologies
- Engineering : Manufacturing & construction
- Materials & Chemicals : Metals

For current licensing status, please contact Jennifer Souter at jennifer@wisys.org or (608) 316-4131