

SUCCESS STORY

NETL TECHNOLOGY FOR SAFER, CLEANER CORROSION-PROTECTING METAL COATINGS LICENSED BY PITTSBURGH START-UP

Corrosion-related issues cost the U.S. economy \$276 billion a year. The Energy Department's National Energy Technology Laboratory (NETL) teamed up with Carnegie Mellon University (CMU) to create a revolutionary, cost-effective technology to reduce that impact—work that resulted in the creation of a new CMU/NETL spin-off that signed a licensing agreement with the laboratory in June.

The new process, which electrodeposits aluminum using standard equipment available in most electroplating shops, is set to make its mark on the industry by replacing coatings based on heavy metals, such as cadmium and chromium, which are expensive and toxic. Electroplating is the process of depositing a metal coating onto an object by putting a negative charge on it and immersing it in a solution.

Called the “Ionic Liquid Solvent for aluminum Electroplating Process,” the innovation has been licensed by LumiShield, a Pittsburgh-based CMU/NETL spin-off that was created based on the new technology. LumiShield specializes in corrosion-resistant metal products that are less expensive and less environmentally harmful than existing approaches.

LumiShield's Hunaid Nulwala, one of the technology's inventors, said that the technology has great potential for reducing the costs of protecting products from corrosion while eliminating some difficult environmental hazards.

“Current electroplating processes devoted to corrosion resistance often use chromium and cadmium as barrier coatings on metals that are used for a range of products, from kitchen appliances and ships to bridge steel, engine parts, and even hip replacement parts,” he said. “But chromium and cadmium are expensive, heavily regulated, and environmentally harmful.”

Aluminum is less toxic than most of the materials used in anti-corrosion coatings, but it cannot be plated in the presence of water, making it much more difficult to apply. In addition, existing technology for aluminum coatings requires an inert atmosphere and uses a toxic chemical called toluene at elevated temperatures as a solvent, requiring it to be performed in sealed vessels. That is a much more expensive coating approach.

The new electroplating technology licensed from NETL by LumiShield uses a plating solution containing ionic liquids (salts in liquid state) in open vessels without creating toxic vapors. The results is a more cost efficient, environmentally responsible process. In addition, the process can be altered to produce a variety of properties and finishes which meet specifications for a range of applications.

Jessica Sosenko, a technology transfer manager at NETL, stressed the importance of corrosion resistance to the economy. “Corrosion-resistant coatings are in demand as a way of reducing costs. The new technology could have a significant positive impact in the fight against corrosion on a wide range of products, resulting in decreased costs and reduced impacts to the environment.”

