WPI MATERIALS SCIENCE & ENGINEERING

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HL 102

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Application of Materials Characterization, Efficacy Testing, and Modelling Methods on Copper Cold Spray Coatings for Optimized Antimicrobial Properties

Abstract

The Copper Development Association (CDA) has identified over 450 copper alloys registered with the U.S. Environmental Protection Agency (EPA) as antimicrobial. With growing antibiotic resistance, there is a need for copper coatings with increased antimicrobial capability. Cold spray is a high velocity, high deposition rate process that forms dense coatings with little to no oxides or inclusions. It is possible that this process contributes to the increased antimicrobial capability of copper cold spray coatings as compared to other additive processes.

   The focus of this effort is to understand the effects of powder production and cold spray process parameters on copper cold spray coatings in order to optimize antimicrobial properties. Specifically, this work looks at the differences in conventional and nanomaterial copper cold spray coatings. Materials characterization and test methods show differences in adhesion, microstructure, corrosion, mechanical properties, and surface topography. Materials data is compared against Abaqus FEA software model outputs, and antimicrobial efficacy test data, based on the EPA approved procedure, is used to support materials observations and modelling outputs.