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The antimicrobial effectiveness of spray deposited copper surfaces

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Abstract

Bacterial contamination on touch surfaces results in increased risk of infection. In the last few decades, work has been done on the antimicrobial properties of copper and its alloys against a range of micro-organisms threatening public health in food processing, healthcare and air conditioning applications; however, an optimum method of copper surface deposition and the resulting mass structure has not been identified.

In order to identify ideal deposition methods and deposit characteristics a study of the disinfection effectiveness of three copper surfaces was performed. The surfaces were produced by the deposition of copper using three methods of thermal spray, namely, plasma spray, wire arc spray and cold spray The surfaces were subsequently inoculated with meticillin-resistant *Staphylococcus aureus* (MRSA). After a two hour exposure to the surfaces, the surviving MRSA were assayed and the results compared.

The cold spray deposition method was significantly more effective than the other methods. It was determined that work hardening caused by the high velocity particle impacts created by the cold spray technique results in a copper microstructure that enhances ionic diffusion, which subsequently improves antimicrobial activity.

Biography

Dennis Helfritch received his Ph.D. from Purdue University. He has carried out work in rocket engines, power generation, environmental controls, chemical and biological decontamination, and materials development. As a physical scientist at the U.S. Army Research Laboratory, he carries out analytical and experimental work related to weapons and environmental issues. This work includes the development of operating parameters and applications for thermal spray deposition technologies, as well as mathematical modeling of the thermal spray process. He is the principal author of over 50 technical papers in journals and symposium proceedings. He holds eleven U.S. Patents.