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MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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TITANIUM COLD SPRAY COATINGS

Abstract

Cold Spray is an emerging technology used for the deposition of coatings for many industries including aerospace. This technique allows the deposition of metallic materials at low temperatures below their melting point. The aim of this research was to develop a test technique that can measure the degree to which a cold spray coating achieves mechanical properties similar to a traditional bulk material. Vickers hardness testing and nanoindentation were used as micro- and nano-scale measurement techniques to characterize the mechanical properties of titanium coatings, deposited at different deposition conditions, and bulk Ti. The mechanical properties of bulk titanium and titanium coatings were measured over a range of length scales, with the indentation size effect examined with Meyer's law. Hardness measurements are shown to be affected by material porosity, microstructure and coating particle bonding mechanism. Hardness measurements showed that Ti coatings deposited at higher gas pressures and temperatures demonstrate an indentation load response similar to bulk Ti.

Key words: titanium, cold spray, Vickers hardness, nanoindentation, indentation size effect, microstructure, mechanical properties