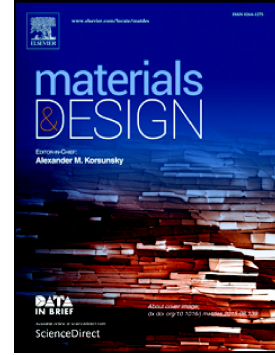


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Function-Dependent Coating Architectures by Hybrid Powder-Suspension Plasma Spraying: Injector Design, Processing and Concept Validation

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Abstract

~~The long standing problems associated with using sub-micron or nanosized powders in conventional plasma spraying to achieve finer microstructures and superior properties have been successfully overcome recently by the Suspension Plasma Spray (SPS) method. The~~ attractive properties achieved by Suspension Plasma Spraying (SPS), combined with the availability of high throughput capable plasma spray systems that permit axial feeding, provide encouragement to explore use of suspensions for next generation functional applications. This paper deals with realization of coatings with various pre-determined function-dependent architectures by employing a hybrid powder-suspension feedstock. Some illustrative application-relevant coating architecture designs are discussed, along with the specific benefits that can accrue by deploying a multi-scale powder-suspension feedstock combination. An elegant feedstock delivery arrangement ~~involving suitable modification of a conventional spray system~~ to enable either simultaneous or sequential feeding of powders and suspensions to enable convenient processing of coatings with desired architectures is presented. As proof-of-concept, deposition of layered, composite and functionally graded coatings using the above system is also demonstrated using appropriate case studies. ~~The vast promise of this approach for designing coating systems involving diverse material chemistries to achieve tailored properties is also discussed.~~

Keywords:

Suspension, Hybrid feedstock, Layered, Composite, Functionally graded, Coatings

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