**Effect of particle size on the ceramic retention of Al/SiC composite by cold spray deposition**

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**Abstract:**

Cold spray deposition as a novel solid-state materials processing technology is currently used to fabricate aluminum matrix composites (AMCs) with a homogenous composition. Hard ceramic particles are prone to rebound during cold spray deposition. Therefore, only a fraction of ceramic particles can be deposited. In this research, two approaches have been proposed to enhance the ceramic retention in metal matrix composite (MMC) deposits: optimization of the size of aluminum (Al) and silicon carbide (SiC) particles; and, use of the laser-assisted cold spray (LACS). Microstructural characterization and hardness testing were performed on the composite depositions. Based on the microstructural characterizations the volume fraction of ceramic content, porosity area fraction, and the quality of interparticle bonding have been investigated. Results indicate that LACS significantly increases the ceramic content of the composite deposition. This can lead to an improvement in the mechanical properties of the as-sprayed composites. This study offers valuable insights into the optimization of MMCs for improved material properties and industrial usability.

Keywords: Metal matrix composites, particle size, ceramic retention, Al/SiC composites.