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Evaluation of the interfacial bonding between particles and substrate in angular cold spray

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Abstract

Investigation on a single particle deposition onto a polished substrate is an effective way to well understand the coating/substrate bonding mechanism in cold spray. But existing studies on this topic are always limited to the particle surface morphology and cross-section observation. This paper presents a methodology to directly observe the fractured contact surface between the cold sprayed particle and substrate. By this means, the particle/substrate fractured contact surfaces at different spray angles were obtained and analyzed. It was found that in the perpendicular spray dimple-like features as a sign of metallurgical bonding were formed at the surrounding of the central region on the fractured contact surface. However, for the angular spray, such dimple-like features only located at a small area of one side. Further analysis suggested that the high contact pressure is the dominant

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