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On the role of oxide film's cleaning effect into the metallurgical bonding during cold spray

Chaoyue Chen^{1#}, Yingchun Xie^{1,2*#}, Renzhong Huang², Sihao Deng¹, Zhongming REN³, Hanlin Liao¹

1. LERMPS, ICB UMR 6303, CNRS, Univ. Bourgogne Franche-Comté, UTBM, France

2. Guangdong Institute of New Materials, China

3. Shanghai University & State Key Laboratory of Advanced Special Steel, China

Abstract: In this work, a novel understanding was proposed to explain bonding process of a cold sprayed Cu particle deposition. The cleaning effect by the extrusion of viscous metal jet was proved for the first time by the observation of oxides fragments located at the periphery of detached particle, which promoted the formation of metallurgical bonding around central area. It is more interests to find the existence of micro-cracks on contact interface, which revealed the clue of interfacial melting. However, the lack of dimple-like fractures suggests that the interfacial melting at the contact interface is not a prerequisite for metallurgical bonding.

Keywords: Cold spray; metallurgical bonding; cleaning effect; oxide film; bonding mechanism

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