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Author: Chunjie Huang, Wenya Li, Yingchun Xie, Marie-Pierre Planche, Hanlin Liao, Ghislain Montavon

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# Effect of Substrate Type on Deposition Behavior and Wear Performance of Ni-coated Graphite/Al Composite Coatings Deposited by Cold Spraying

Chunjie Huang <sup>1,2</sup>, Wenya Li <sup>2,\*</sup>, Yingchun Xie <sup>1</sup>, Marie-Pierre Planche <sup>1</sup>, Hanlin Liao <sup>1</sup>, Ghislain Montavon <sup>1</sup>

<sup>1</sup> ICB UMR 6303, CNRS, Univ. Bourgogne Franche-Comté, UTBM, F-90100 Belfort, France

<sup>2</sup> State Key Laboratory of Solidification Processing, Shaanxi Key Laboratory of Friction Welding Technologies, Northwestern Polytechnical University, Xi'an 710072, China

\* Corresponding author: Tel.: +86 29 88495226; Fax: +86 29 88495226.

E-mail address: [liwy@nwpu.edu.cn](mailto:liwy@nwpu.edu.cn) (W. Li).

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## Abstract

This work focused on the deposition characteristics and wear behavior of Ni-coated graphite mixed with 40 vol.% Al (Ni-Gr/Al) composite coatings sprayed on an Al alloy and a steel substrate by cold spraying (CS). The morphology of the flattened Ni-Gr particles was examined by single-impact tests. Cross-sectional microstructure and wear performance of the Ni-Gr/Al composite coatings were studied. Results showed that a larger number of Ni-Gr particles were finally bonded with the steel substrate, whereas many craters existed on the Al alloy substrate after the single-impact tests. The coating on the steel substrate had a high thickness, high graphite content and low coefficient of friction (COF) compared to those on the Al alloy substrate. In addition, the CS coatings presented a homogeneous distribution and uniform morphology of graphite, and a comparative COF to that of conventional thermal sprayed coatings. It was shown that CS could avoid the decomposition and transformation of graphite phase.

**Keywords:** Cold spraying; Ni-coated graphite; Deposition behavior; Microstructure; Wear performance

## 1. Introduction

Acting as one of abradable sealing coatings at intermediate temperature (up to 480 °C),

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