Substrate-dependent deposition behavior of graphite particles dry-sprayed at room temperature using a nano-particle deposition system

Mohammad Nur E Alam Al Nasim, Doo-Man Chun

PII: S0257-8972(16)31194-X
DOI: doi:10.1016/j.surfcoat.2016.11.062
Reference: SCT 21808

To appear in: *Surface & Coatings Technology*

Received date: 9 June 2016
Revised date: 27 October 2016
Accepted date: 16 November 2016

Please cite this article as: Mohammad Nur E Alam Al Nasim, Doo-Man Chun, Substrate-dependent deposition behavior of graphite particles dry-sprayed at room temperature using a nano-particle deposition system, *Surface & Coatings Technology* (2016), doi:10.1016/j.surfcoat.2016.11.062

Substrate-dependent deposition behavior of graphite particles dry-sprayed at room temperature using a nano-particle deposition system

Mohammad Nur E Alam Al Nasim, Doo-Man Chun*

School of Mechanical Engineering, University of Ulsan, Ulsan, Republic of Korea

**Corresponding Author - TEL: +82-52-259-2706, FAX: +82-52-259-1680, E-mail: dmchun@ulsan.ac.kr*

Abstract

This work demonstrates the effect of the substrate upon the deposition of graphite microparticles during thin film preparation at room temperature using a nanoparticle deposition system (NPDS). NPDS is a dry spray deposition method, whereby various metal and ceramic powders can be deposited at room temperature without the use of any binders. Graphite powder was deposited on various substrates of different hardness, namely polystyrene, copper, glass, and sapphire, and the substrate-dependent deposition behaviors were investigated. For the soft polystyrene substrate, graphite particles fragmented into small pieces during deposition, but retained the original graphite crystal structure. For the copper substrate, which is of intermediate hardness, some areas of the deposited film showed fragmented particles that had undergone interlayer separation to yield few-layer graphene flakes, but in other areas of the film a fragmented graphite structure was observed, of particles that did not undergo interlayer separation. In contrast, intense fragmentation and interlayer separation of microscale graphite particles to form small and few-layer graphene flake structures were observed on the hardest