

## **Hybrid thermally sprayed coatings deposition using graphene family nanomaterials as lubrication facilitators for wear resistant applications.**

J. Patrikalos, P. Ioannou, D. Andreouli, Ch. I. Sarafoglou, I. Georgiopoulos

Metal Matrix Composite materials have been widely used since many years in every day industrial practice as coatings to provide higher mechanical strength, elastic modulus, yield strength, wear and abrasion resistance compared to monolithic metal components. Thermal spray is for many decades a well-established technology for the deposition of these coatings. Lately Graphene Family materials such as carbon nanotubes, graphene oxide etc. are potential candidates as reinforcement particulates in metal matrix composites due to their exceptional mechanical, electrical and thermal properties with additional interest in their micron to nano scale size.

In the current study the deposition parameters optimization affecting the tribological behavior of hybrid thermal spray coatings is presented. Coatings consist of metal matrix composite powders (e.g WC-Co, Cr<sub>3</sub>C<sub>2</sub>-NiCr) combined with graphene materials. The mixing and homogenization processing of the feedstock powders is thoroughly discussed along with the effect of deposition parameters on the uniformity and quality of the developed coatings. Finally, their wear resistance is quantified through pin-on-disc measurements. Apart from their increased wear resistance they exhibit self lubricating conditions in service thus revealing their hybrid functionality.

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