

Thermal Spray of Nanostructured Materials

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Abstract

As a recent progress of nano-structured materials, thermal spraying is one of the most interesting areas that enhance the surface properties while conventional matrixes are used. A few improved surface properties are improved hardness and wear resistance. In this study, two kinds of nanostructured thermal sprayed coatings are presented in this paper. One is a WC-based coating, and the other is a solid lubricant coating.

In the present study, in order to figure out a proper process for the nanostructured WC-Co coating fabrication, several noble thermal spray techniques such as high-velocity oxy-fuel (HVOF) spraying and cold spraying. The cold spraying have been attempted because of their low or almost no heat transfer characteristics. In addition, four types of nanostructured WC-Co powders from different manufacturers have been utilized in thermal spraying to investigate the effects of powder morphology and powder fabrication methods. Also, further improvement of coatings via heat treatment will be presented.

For the solid lubricant coating, a new feed stock powders such as NiCr-Cr₂O₃-Ag-BaF₂/CaF₂ composition powders including a nano component (under 100nm Cr₂O₃) are used through a spray drying method. Microstructure and mechanical properties of the nano Cr₂O₃ containing coatings were evaluated and compared with a blended feedstock. The application results of the coatings will be also presented.