

Tribological properties of Ni-based composite coatings containing silver vanadate at elevated temperatures

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ABSTRACT

The preparation method of Ni-based composite coatings containing silver vanadate and its tribological properties at room temperature to high temperature were studied. The silver vanadate particles were prepared by chemical method and were observed by scanning electron microscope (SEM). The silver-vanadate containing nickel-based composite coatings were prepared by the pulse electrodeposition process. The phase compositions were analyzed by using X ray diffraction (XRD), energy dispersive spectroscopy (EDS) and Raman spectroscopy. The tribological properties of the coating were tested by HT-1000 high temperature friction tester at room temperature, 200 °C and 600 °C. The effects of different content of silver vanadate additives and temperature on the tribological properties of the composite coatings were compared in order to obtain the best technological parameters of silver-vanadate containing nickel-based composite coating. The morphology of wear scars after friction were analyzed by using scanning electron microscopy (SEM) with silver vanadate as a self lubricating material feasibility. The results show that the friction coefficient of single Ni-based coating is about 0.75, while that of the composite coating is between 0.4-0.7. Especially at high

temperature, the antiwear effect is obvious. The results shows that the composite coating containing silver vanadate has better antiwear and lubrication effect than pure nickel base coating, and the friction reducing effect increases with the addition of silver vanadate within a certain content range.

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