

Tribological Properties of Different Mass Ratio High Velocity Oxygen Fuel-Sprayed Al₂O₃-TiO₂ Coatings on Ti-6Al-4V Alloy

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Abstract : Ti-6Al-4V alloys are widely used in biomedical industries because of its attractive mechanical and physicochemical properties. However, they have poor wear resistance. High velocity oxygen fuel (HVOF) coatings were investigated as a way to improve the wear resistance of this alloy. In this paper, different mass ratio of Al₂O₃-TiO₂ powders (60/40, 87/13 and 97/3) was employed to enhance the tribological properties of Ti-6Al-4V. The tribological behavior was investigated by wear tests using ball-on-disc and pin-on-disc tribometer. The microstructures of the contact surfaces were determined by a scanning electron microscopy before and after the test to study the wear mechanism. Uncoated and coated surfaces after wear test are also subjected to micro-hardness tests. The tribological test results showed that the microhardness, friction and wear resistance of coated Ti-6Al-4V alloys increases by increasing TiO₂ content in the powder composite when other experimental conditions were constant. Finally, Al₂O₃-TiO₂ powder composites for the investigated conditions, both coating samples had satisfactory values of friction and wear resistance, and they could be suitable candidates for Ti-6Al-4V material.

Keywords : HVOF (High Velocity Oxygen Fuel), Al₂O₃-TiO₂, Ti-6Al-4V, tribology

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