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Microstructure and tribological properties of plasma sprayed alumina and alumina-graphite coatings

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Abstract

Al₂O₃ and Al₂O₃-graphite composite coatings were prepared on stainless steel by atmospheric plasma spraying. The influence of spraying distance and graphite addition on the coating microstructure, phase composition and tribological properties were investigated. The elemental composition results indicated that the increase of spraying distance slightly increased the graphite concentration in composites. The X-ray diffraction results of Al₂O₃ coatings revealed the presence of α -Al₂O₃, γ -Al₂O₃ and β -Al₂O₃ phases. The friction coefficient of Al₂O₃ coatings varied in the range of 0.74-0.75, whereas with the addition of graphite into the alumina powders the friction coefficient of the coatings reduced to 0.34-0.38. It was found that the wear resistance of the Al₂O₃-graphite composite coating was superior to that of the Al₂O₃ coating when the spraying distance was 60 mm.

Keywords: Alumina-graphite, composite coatings, plasma spraying, tribological properties, friction coefficient.

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