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Effect of the Addition of CeO_2 on the Microstructure and Corrosion of in-situ TiB/Ti Composite Coatings Prepared by Laser Cladding Technology

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Ti alloy coating is a common composite coating. However, a few studies focus on the corrosion resistance of the coatings. Herein, TiB composite coatings were successfully fabricated on the surface of a Ti–6Al–4V alloy with Ti/B/CeO_2 powders by *in situ* laser cladding technology, and the microstructure and corrosion resistance were investigated. The cladding coating and the substrate metallurgically combined well after laser cladding treatment. The coatings consisted of TiB and α-Ti phase. The addition of CeO_2 contributed to the formation of a uniform and refined microstructure of the cladding coatings. The microhardness of the cladding coating was improved, and it is threefold to fourfold higher than that of the substrate when the addition of CeO_2 was 3 wt%. The corrosion properties were significantly improved. Electrical impedance spectroscopy and polarization tests showed that the corrosion resistance of the cladding coatings with 3 wt%CeO_2 was better than those of other samples. All samples exhibited an obvious near-capacitive behaviour after immersion in a corrosive medium.

Keywords: Laser cladding; Ti-6Al-4V alloy; CeO_2; microhardness; corrosion resistance

FULL TEXT