Fe-C-Si ternary composite coating on CP-titanium and its tribological properties


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Abstract

This study focused on the development of ternary composite coating through incorporation of Fe-C-Si ternary powder mixtures on CP-Ti substrate and characterizes the microstructure, hardness and wears behavior in presence of Jatropha oil. In this work, the surface of commercial purity titanium (CP-Ti) was modified using a tungsten inert gas (TIG) surface melting technique. The wear behavior of coated CP-Ti was performed utilizing pin-on-disk machine. The results showed that the melt track had dendritic microstructure which was homogenously distributed throughout the melt pool. This Fe-C-Si ternary composite coating enhanced the hardness of CP-Ti significantly from 175 HV for the untreated substrate to ~800 HV for the Fe-C-Si coated CP-Ti due to the formation of intermetallic compounds. The wear results showed that less wear volume loss was observed on the composite coated CP-Ti in presence of Jatropha biodiesel compared to uncoated CP-Ti. The achievement of this hardened Fe-C-Si composite coating on the surface of CP-Ti can broaden new prospect for many engineering applications that use biodiesel under different tribological variables. © Published under licence by IOP Publishing Ltd.

Indexed keywords


Optimization of tribological performance of SiC embedded composite coating via Taguchi analysis approach

Influence of Ti addition on fracture behaviour of HSLA steel using TIG melting technique

IOP Conference Series: Materials Science and Engineering

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Thin surface layers of iron-based alloys deposited by TIG hardfacing


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View at Publisher (https://www.scopus.com/redirect/linking.uri?targetURL=https%3a%2f%2fdoi.org%2f10.4028%2fwww.scientific.net%2fAMR.150074906971516&issn=16628985&linkType=ViewAtPublisher&year=2014&origin=reflist&dig=1dc11160e0c05332c34af2a4ba19061f&recordRank=)

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