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PARAMETERS OPTIMIZATION, MICROSTRUCTURE AND MICRO-HARDNESS OF SILICON CARBIDE LASER DEPOSITED ON TITANIUM ALLOY

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Abstract

Silicon carbide (SiC), has excellent mechanical properties such as high hardness and good wear resistance, and would have been a suitable laser-coating material for titanium alloy to enhance the poor surface hardness of the alloy. However, SiC has poor wettability to titanium alloy, and there is high heat buid up in the alloy during laser coating which leads to cracking. Moreover, optimization of the process parameters is a major challenge of the laser coating process. This investigation is a detailed study of the optimization characteristic of SiC laser deposited on titanium alloy. In addition, Al and Ti powders are blended with SiC prior to laser coating to minimize heat build up and avoid tendency to cracking. The microstructure, phase composition and microhardness of the coatings were studied. In contrast to the pure SiC, the cermet yielded a crack-free coating. A significant increase in hardness was obtained: 254.5 Hv0.3 in the as-received; 1372.7 Hv0.3 in the pure SiC-coated, and 1923.5 Hv0.3 in the cermet-coated samples

Keywords: Silicon carbide; laser coating; optimization; microstructure; micro-hardness