

Mechanical properties of titanium-hydroxyapatite (Ti-HA) composite coating on stainless steel prepared by thermal spraying

ABSTRACT

Addition of hydroxyapatite (HA) can enhance the bioactivity of the common metallic implant due to its similarity with natural bones and teeth. In this investigation, high velocity oxy-fuel (HVOFT) technique was used to deposit titanium-hydroxyapatite (Ti-HA) composite on stainless steel substrate plate with different percentage of HA for biomedical applications. The aim of this research is to investigate the mechanical properties of Ti-HA coating such as hardness, adhesion strength and wear behaviour. The hardness and strength was determined by using SHIMADZU-microhardness Vickers tester and PosiTest AT portable adhesion tester respectively. The wear test was performed by using pin-on-disk equipment and field emission scanning electron microscope (FESEM) used to determine the extent of surface damage. From the results obtained, mechanical properties such as hardness and adhesion strength of titanium (Ti) coating decreased with the increased of HA contents. Meanwhile, the coefficient of friction of Ti-10% HA coating shows the highest value compare to others as three-body abrasion had occurred during the test.

Keyword: Ti-HA coating; Stainless steel; HVOFT technique; Mechanical properties