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Abstract

In this study, bioactive glass powders were synthesized from four different types of oxides (SiO_2 , P_2O_5 , CaO and MgO). These oxides were mixed, melted and milled to produce two materials of $31\text{SiO}_2\text{-}11\text{P}_2\text{O}_5\text{-(}58\text{-x)-CaO-xMgO}$, where the values $x=0$ and $x=2$ describe powders P0 and P2, respectively. The powders were sieved to obtain a particle size distribution of $8.8 - 66.2 \mu\text{m}$ for P0 and $5.1 - 61.6 \mu\text{m}$ for P2. The powders were flame sprayed onto AISI 316L stainless steel and Ti6Al4V alloy substrates using a modified Terodyn 2000 (Eutetic-Castolín) gun. The flame-forming gas was a mixture of $\text{O}_2 - \text{C}_2\text{H}_2$ (38/22 L/min). The microstructure of the powders and the obtained coatings was examined by SEM. X-ray diffraction (XRD) was used to identify the crystalline phases in the powders and coatings. The hardness and fracture toughness of the coatings were determined by Vickers micro-indentation tests. According to the feed stock powder, the substrate material and thermal spraying parameters, the microhardness of the coatings was between 4.1 ± 0.5 and 5.2 ± 0.6 GPa, and their fracture toughness was

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