ABSTRACT

Low-density Ti-Mg and Ti-Al-Mg alloy specimens have been produced by sintering mechanically alloyed powders. Alloying titanium with low-density elements has been found to reduce costs while improving on properties such as strength. Very few researchers have sintered Ti-Mg based alloys, thus literature on these alloys is very limited. The powders used in this work had been milled for different times. Consolidation was carried out at 27 and 33MPa. The specimens were sintered in a tube furnace under argon, at temperatures ranging from 630 to 900°C for up to 10 hours. Higher green densities were achieved at 33MPa. A decrease in green density with increasing milling time was observed. No sintering occurred at 630°C. Most of the samples were soft which made surface preparation difficult. Sintering produced porous samples with some showing extensive and interconnected porosity. Reduced porosities were observed on samples consolidated at 33MPa and sintered at higher temperature (900°C). Ti-6Al-4Mg specimens recorded hardness values of up to 914HV. XRD analysis revealed dissociation of the solid solutions formed during milling and oxidation in other samples. The Mg content retained in the sintered samples ranged between 0.5 and 4wt%. Densities as low as 4.23 and 4.21g/cm^3 were achieved in Ti-10Mg and Ti-20Mg samples respectively. These density results are promising since they are comparatively lower than those of most Ti-based alloys**.** Further work will aim to reduce porosity, oxidation and magnesium losses.