HYDROXYAPATITE ALUMINA COMPOSITES

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In the present study, the effect of sintering on alumina (Al₂O₃) doped commercially available synthetic hydroxyapatite (CSHA) composites were investigated via a series of analysis and mechanical tests. The rates of Al₂O₃ were in weight %2.5 and %5. Sintering temperatures were change between 900°C and 1300°C. Experimental results show that CSHA powders are stable up to 1100°C, but it starts to decomposition at higher temperatures and occurs in HA matrix some second and/or third phases such as α-TCP, β-TCP and CaO. Due to the formation of these phases compressive strength of CSHA powders drastically decrease at elevated temperatures. However, Al₂O₃ doped samples are stable up to 1200°C, this is related to reduction of undesirable phases and also grain growths via doped material. Some calcium aluminum oxide phases such as CaAl₂O₄, CaAl₄O₇ and Ca₂Al₃O₆ were detected for CSHA- Al₂O₃ composites. This are related to formation of reactions between CaO and Al₂O₃. After SEM analysis, microcracks were identified for CSHA powders sintered at 1200°C and 1300°C. No microcracks were observed for CSHA-Al₂O₃ composites at same temperatures. While the highest density and hardness values were obtained to pure CSHA as 3.06 gr/cm³ and 4.62 GPa, the highest compressive strength was obtained to CSHA-5A samples sintered at 1200°C as 214 MPa.

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