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Microstructural Improvement of Hydroxyapatite-ZrO2 Composite Ceramics via Thermal Precipitation Techniques.

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Hydroxyapatite-ZrO_2 composite ceramic were synthesized using a thermal precipitation techniques. The chemical precursors were prepared from di-ammonium hydrogen orthophosphate, calcium oxide (CaO) derived from chicken eggshell, zirconium dioxide (ZrO_2) and distilled water. The mixture were heated at the various temperatures from 100 to 700^{o}C in the furnace with an incremental temperature of 100^{o}C. The ZrO_2 contents in the composite ceramic were varied from 0 to 15 percent weight of CaO. The prepared composites were then annealed at 300, 600 and 700^{o}C for 4 h in air. The crystal structure, function group and morphology of all samples were characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), field emission scanning electron microscopy (FESEM) and universal testing machine (UTM), respectively. The results indicated that the undoped-ZrO_2 samples hydroxyapatite phase with a hexagonal structure. However, the hydroxyapatite was transformed to the tri-calcium phosphate after thermal treatment at 700^{o}C. For the doped-ZrO_2 samples, the hydroxyapatite and ZrO_2 phases were found. Moreover, the result showed that the compressive strength of hydroxyapatite-ZrO_2 composite ceramic increased with increasing the ZrO_2 content.

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