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

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Hydroxyapatite-ZrO₂ 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 (ZrO₂) and distilled water. The mixture were heated at the various temperatures from 100 to 700°C in the furnace with an incremental temperature of 100°C. The ZrO₂ 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°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-ZrO₂ samples hydroxyapatite phase with a hexagonal structure. However, the hydroxyapatite was transformed to the tri-calcium phosphate after thermal treatment at 700°C. For the doped-ZrO₂ samples, the hydroxyapatite and ZrO₂ phases were found. Moreover, the result showed that the compressive strength of hydroxyapatite-ZrO₂ composite ceramic increased with increasing the ZrO₂ content.

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