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# Development of a Biomaterial from Naturally Occurring Chloroapatite Mineral for Biomedical Applications

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**Abstract :** Hydroxyapatite is a bioceramic which can be used for applications in orthopedics and dentistry due to its structural similarity with the mineral phase of mammalian bones and teeth. In this study, it was synthesized, chemically changing natural Eppawala chloroapatite mineral as a value-added product. Sol-gel approach and solid state sintering were used to synthesize products using diluted nitric acid, ethanol and calcium hydroxide under different conditions. Synthesized Eppawala hydroxyapatite powder was characterized using X-ray Fluorescence (XRF), X-ray Powder Diffraction (XRD), Fourier-transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), Thermogravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC) in order to find out its composition, crystallinity, presence of functional groups, bonding type, surface morphology, microstructural features, and thermal dependence and stability, respectively. The XRD results reflected the formation of a hexagonal crystal structure of hydroxyapatite. Elementary composition and microstructural features of products were discussed based on the XRF and SEM results of the synthesized hydroxyapatite powder. TGA and DSC results of synthesized products showed high thermal stability and good material stability in nature. Also, FTIR spectroscopy results confirmed the formation of hydroxyapatite from apatite via the presence of hydroxyl groups. Those results coincided with the FTIR results of mammalian bones including human bones. The study concludes that there is a possibility of producing hydroxyapatite using commercially available Eppawala chloroapatite in Sri Lanka.

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