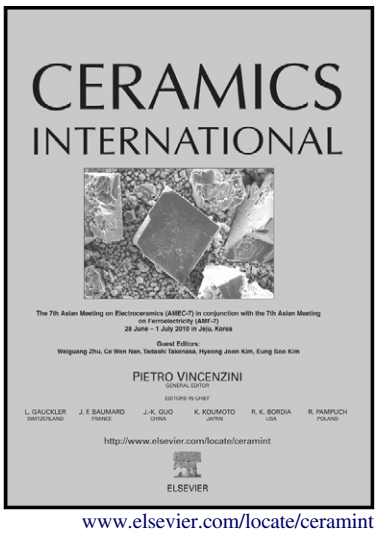

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Physicochemical characterization of the superhydrophilic, magnesium and silver ions co-incorporated nanocrystalline hydroxyapatite, synthesized by microwave processing

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Abstract

Magnesium (Mg^{2+}) and silver (Ag^{1+}) ions co-incorporated nanocrystalline hydroxyapatite (HAp, 31 × 19 nm) was synthesized by microwave processing. The prepared samples were characterized using XRD (X-ray Diffraction), FTIR (Fourier Transform Infrared), FE-HRTEM (Field Emission-High Resolution Transmission Electron Microscopy), DLS (Dynamic Light Scattering), Zeta potential, microhardness, and PL (Photoluminescence). In addition, antimicrobial, wettability and *in vitro* bioactivity were also analyzed. The Mg^{2+} and Ag^{1+} ions co-incorporation did not modify the phase of the HAp; however, there was a significant reduction in the crystallite size (13%) and particle size (31%) respectively. The negative zeta potential was decreased with an increase in the Mg^{2+} and Ag^{1+} ions co-incorporation. The microhardness (<0.05 M), PL (<0.01 M), antimicrobial efficacy and *in vitro* bioactivity were enhanced in the co-incorporated samples. The surface of the co-incorporated sample was superhydrophilic in nature. These multifunctional properties, enable them to be an excellent candidate for bone replacement and biosensing applications.

Keywords: A. Microwave processing; C. Hardness; C. Optical properties; E. Biomedical applications

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