Synthesis, characterization and \textit{In vitro} studies of magnesium, fluoride co-substituted hydroxyapatite nanoparticles for dental applications

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Synthetic hydroxyapatite $[\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2, \text{HAP}]$ is the commonly used calcium phosphate based material in dental application due to its excellent biocompatibility and similar composition and structure to human hard tissues. Recently, the main interest on the researchers is to control the shape and size of substituted HAP particles such as silver, magnesium, strontium, fluoride etc., which enhance the new bone formation with an eventual effect of decreasing the risk of fractures. In which, magnesium (Mg$^{2+}$) is known to be an important trace element in bone and teeth. It plays a key role in bone metabolism, in particular during the early stages of osteogenesis where it stimulates osteoblast proliferation, and its depletion causes bone fragility and bone loss. The growing evidence on the beneficial role of fluoride (F$^-$) in dentistry has increased its interest as a substituent in HAP for dental application. The present work deals with the synthesis of magnesium, fluoride co-substituted hydroxyapatite (Mg, F-HAP) nanoparticles by microwave irradiation method. All the as-synthesized samples were investigated by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM) and energy dispersive X-ray analysis (EDAX). The \textit{In vitro} cell viability of the as-synthesized nanoparticles was evaluated. Thus the as-prepared Mg, F-HAP sample can act as a potential candidate for dental applications with good bioactivity.

\textbf{Keywords:} Substituted hydroxyapatite; Microwave irradiation method; Nanoparticles; Bioactivity: Dental applications.

\textbf{Biography}

Dr. L. Kavitha, completed Ph.D., from the Department of Physics, Bharathidasan University, Tiruchirapalli, India and she worked as Assistant Professor of Physics at Periyar University, Salem, Tamil Nadu India, during 2004-2014. Presently she is working as Associate Professor of Physics, School of Basic and Applied Sciences, Central University of Tamil Nadu, Thiruvarur, Tamilnadu. She has 18 years of research and 15 years of teaching experience. She is an eminent researcher with immense contributions in Theoretical and computational nonlinear dynamics and also in Materials Science. She has guided 11 Ph.D., students. She has published 110 research articles in peer reviewed International journals of high repute and presented 165 papers in national and international conferences. She has four book chapters with international publishers like Elsevier and Springer and has filed 2 Indian and 1 US patents. Her proficiency and contributions in the scientific research has fetched her various prestigious awards like Young Scientist Award 2014 by the Academy of Sciences, Chennai, Tamilnadu, UGC research award (2013), Mileva Mavic Einstein Award (2013), Landhal Award, USA (2011), European Science Foundation fellowship, Austria (2011) and Young Scientist Research Award- BRNS (2010). She has mobilized grants from various national funding agencies of India through major research projects. She has established collaboration with many Indian and International eminent scientists and visited countries like Italy, France, Germany, Spain, Portugal, Slovenia, Latvia, Austria, Poland, Hungary and USA. She is the Regular Associate of International Centre for Theoretical Physics (ICTP), Italy (An UNESCO and IAEA Institute), for five years (2014-2019).

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