

Development of theranostic nanomaterial: Synthesis and Characterization of novel fluorescent crystalline mesoporous β -Tricalcium Phosphate nanoparticles

SILVA, F.R.O.¹, BRESSIANI, A.H.A., LIMA, N.B.

*¹Centro de Ciência e Tecnologia dos Materiais, Instituto de Pesquisas Energéticas e Nucleares, São Paulo – Sp – Brazil
frsilva@ipen.br*

ABSTRACT

O Calcium phosphates, including hydroxyapatite [HA, $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$] and beta-tricalcium phosphate [β -TCP, $\text{Ca}_3(\text{PO}_4)_2$], are the main mineral component of bone tissue and teeth. The synthetic calcium phosphates are of special interest in medicine because of their biocompatibility, bioactivity and non-toxicity. β -TCP is advantageous to HA for drug delivery system due to their high solubility and controllable bioresorption rate. To obtain β -TCP, the literature reports the transformation of calcium deficient hydroxyapatite (CDHA) to β -TCP since it could not be synthesized directly in aqueous solution, until now. For the first time, fluorescent β -TCP have been successfully synthesized by wet precipitation method at room temperature with a Ca/P molar ratio equal to 1.5 and doped with europium ion. The present work is concerned with the preparation of β -TCP and its characterization through XRD, Fluorescence and TEM analysis. The results showed well-characterized peaks of crystalline pure β -TCP (JCPDS 09-0169) for the dried powder, with intense visible emission. The TEM micrographs exhibit mesoporous structure, which is suitable as a drug carrier.

Keywords: Theranostic nanomaterial. β -TCP. Fluorescence. Europium