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, Ca$_{10}$(PO$_4$)$_6$(OH)$_2$] and beta-tricalcium phosphate [β-TCP, Ca$_3$(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 it 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 exhibits mesoporous structure, which is suitable as a drug carrier.

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