

Calcium phosphates doped with lanthanide ions: Synthesis and characterization

Ercules Epaminondas de Souza Teotonio¹, José Hundemberg P. Barga¹, Wagner Mendonça Faustino¹, Hermi Felinto Brito², Maria Cláudia França da Cunha Felinto³

¹Universidade Federal da Paraíba, ²Instituto de Química - USP -SP, ³Instituto de Perquisas Energéticas e Nucleares

e-mail: teotonioees@quimica.ufpb.br

Calcium phosphate ceramics have been intensively investigated because of their properties such as biocompatibility and absence of toxicity, allowing their use in the medical field being applied as a substitute for bone implants. Since bioceramics are mesoporous materials, these systems can also be applied as drug carriers. In this regard, drugs are incorporated into the porous structure to be subsequently released in a controlled form of the bone graft or implant into the surrounding tissue and a well-established kinetics. In addition to these properties, characteristic luminescence of lanthanide ions can further extend the range of biomaterials applications. Thus, this work presents the synthesis and characterization of calcium phosphate, doped with lanthanide ions, varying the phase and the proportion of dopants and co-dopants between 0.5 and 2% of the calcium mass, in order to obtain matches with characteristics that enable their use in biological systems.

In order to characterize and evaluate the properties of these materials, the following techniques were applied: X-ray diffraction; Infrared spectroscopy; which confirmed the bruchita, monetite and calcium pyrophosphate phases. The excitation spectra for the doped samples with Eu^{3+} and/or Tb^{3+} had the emission monitored in hypersensitive ${}^5\text{D} \rightarrow {}^7\text{F}_2$ (~612 nm for Eu^{3+}) and ${}^5\text{D}_4 \rightarrow {}^7\text{F}_5$ (~545 nm for Tb^{3+}) transitions, respectively. These spectra presented narrow bands associated with intraconfigurational transitions from the levels ${}^7\text{F}$ and ${}^7\text{F}_1$ to the excited ${}^{2\text{S}+1}\text{L}_j$ (for Eu^{3+}) and ${}^7\text{F}_6 \rightarrow {}^{2\text{S}+1}\text{L}_j$ (for Tb^{3+}). Besides, in the emission spectra are observed only narrow bands related to the intraconfigurational transitions ${}^5\text{D} \rightarrow {}^7\text{F}_j$ for phosphates doped with Eu^{3+} ion and ${}^5\text{D}_4 \rightarrow {}^7\text{F}_j$ for those ones doped with Tb^{3+} ion.

ACKNOWLEDGEMENT

UFPB, CNPQ-FACEPE, INCT-INAMI