

ISBN 978-85-63274-02-4

A large, stylized graphic of a green leaf, composed of several overlapping, semi-transparent layers of varying shades of green. The leaf is oriented vertically, with its tip pointing upwards and its base pointing downwards. It is positioned in the background, behind the main text.

# **International Conference on Food and Agriculture Applications of Nanotechnologies**

Editors:

**Caue Ribeiro**

**Odílio Benedito Garrido de Assis**

**Luiz Henrique Capparelli Mattoso**

**Sergio Mascarenhas**

São Pedro, SP  
2010

1st Edition  
1st print: 500 copies

Anais da 1. International Conference of Food and  
Agriculture Applications of Nanotechnologies –  
São Pedro: Apor Software, 2010.  
284 p.

ISBN 978-85-63273-02-4

1. Nanotechnologies – Events. 2. Ribeiro, Caue. 3.  
Assis, Odílio Benedito Garrido de. 4. Mattoso, Luiz  
Henrique Capparelli. 5. Mascarenhas, Sergio



## Synthesis of Porous Nano-Hydroxyapatite for Medical and Veterinarian Applications

M. A. Napolitano<sup>(1)\*</sup>, C. Ribeiro<sup>(2)</sup> and E. R. Camargo<sup>(3)</sup>

(1) DMC Equipamentos LTDA EPP, Rua Sebastião de Moraes 831, São Carlos, SP – Brasil CEP: 13562-030; DQ, Universidade Federal de São Carlos, e-mail: marcos@dmc-dental.com.br

(2) EMBRAPA Instrumentação Agropecuária, Rua XV de Novembro, 1452. São Carlos, SP - Brasil - CEP 13560-970.

(3) DQ, Universidade Federal de São Carlos, São Carlos, SP – Brasil.

\* Corresponding author.

**Abstract** – Ceramic of porous hydroxyapatite or presents many biomedical and bioveterinarian applications, with special prominence in the regeneration of bony and in the cellular proliferation, being used thoroughly in the bony rebuilding. Due to this great interest, the main objective of this work is the evaluation synthesis of the hydroxyapatite and their characterization. The synthesis was based on the method of the polymeric precursors in different conditions and the obtained powders were characterized by conventional techniques. It can be checked the first results in XRD (fig. 1 and fig. 2), presented the better results in 1000 °C to 12 hours.

Biocompatible materials with bones with osteoconductive properties serves as medium for the reorganization and bony growth, driving the tissue regeneration. The hydroxyapatite (HA) it is a phosphate of hydrated calcium  $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ , majority component (about 95%) of the mineral phase of the bones and human teeth. Due to its similarity with the bony tissue, the HA allows for fibroblasts proliferation, osteoblasts and other bony cells [1].

The Hydroxyapatite chemical and structural characteristics allows for its use in medical and veterinarian area as material biocompatible in you implant and prostheses. A main issue in orthopaedics is regarding its use as coating of metallic prostheses to promote a stable interface between the implanted material and the alive tissue [2].

The of Hydroxyapatite (HA) based polymeric resins were obtained here by the method of the polymeric precursory using citric acid with a initial molar ratio  $\text{Ca}/\text{P}=1,67$ . After the polymerization, the material is pre-calcinated for elimination of the organic fraction, in electric oven at 350 °C (XRD fig. 1) to a rate of heating of 10 °C/minute. The obtained resins were calcinated in electric oven, in temperatures of 750, 900 and 1000 °C (XRD fig. 2), during 1/2, 2 and 12 hours for each temperatures. During these procedures, we obtained HA nanoscale powders of diferente grains sizes cristallinity degress and hence different densities of defects (mainly vacancies of oxygen).

The characterization was performed by X-Ray Diffraction (XRD).

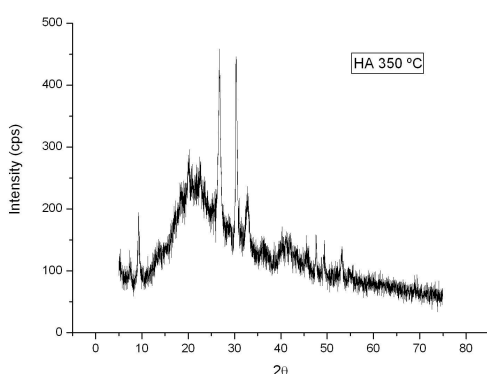


Figure 1: HA pré-calcinated

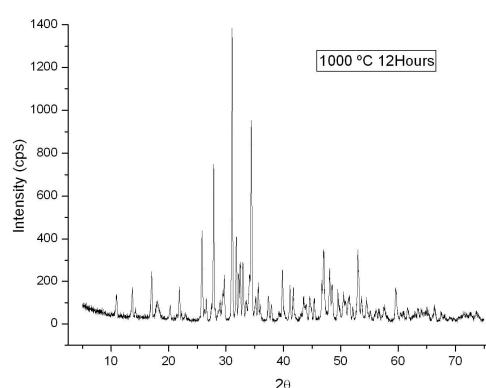


Figure 2: HA calcinated at 1000 °C 12 Hs

### References

- [1] Williams D.F. (1987). "Definitions in Biomaterials", In: Progress in Biomedical Engineering [Proceedings of a Consensus Conference of the European Society for Biomaterials], Ed.: D.F. Williams. Amsterdam: Elsevier. v. 4, chap. 6, p. 49-59.
- [2] Rosa, A. L.; Beloti, M. M.; Noort, R. V.; Hantton, P. V.; Devlin, A. J., *Surface topography of hydroxyapatite affects ROS17/2.8 cells response*, Pesqui Odontol Bras 2002: 16(3):209-215.