THERMAL, VIBRATIONAL, STRUCTURAL, COMPOSITIONAL, AND MORPHOLOGICAL STUDIES OF PIG HYDROXYAPATITE OBTAINED BY CALCINATION AT LOW HEATING RATES AND COOLED IN FURNACE AIR

Sandra M. Londoño-Restrepo1, Cristian F. Ramirez-Gutierrez1, M. A. Mondragón2, Alicia del Real3, Mario E. Rodriguez-García2

1Posgrado en Ciencia e Ingeniería de Materiales, Centro de Física Aplicada y Tecnología Avanzada, Universidad Nacional Autónoma de México, Campus Juriquilla, Querétaro, Qro., México. 2Departamento de Ingeniería Molecular de Materiales, Centro de Física Aplicada y Tecnología Avanzada, Universidad Nacional Autónoma de México, Campus Juriquilla, Querétaro, Qro., México. 3Departamento de Nanotecnología, Centro de Física Aplicada y Tecnología Avanzada, Universidad Nacional Autónoma de México, Campus Juriquilla, Querétaro, Qro., México.

Xenograft is an excellent alternative to surgical implants, bone fillings, and in general in the medical field, so it has a growing demand. Biohydroxyapatite (BHA) is the major component of the mineral bone phase, but it is immersed in an organic phase that contains fat, protein, genetic material, among others. In order to produce biohydroxyapatite similar to human hydroxyapatite, it is necessary to understand the physicochemical characteristic of mammalian bones that are an excellent source for BHA production. Also, it is very important to guarantee the conditions to removal the organic phase without structural changes in BHA. It is well known that thermal variables such as annealing temperature, sintering time, and heating and cooling rate can modify physicochemical properties of BHA, so it is important to know how these parameters act during calcination process. This work focuses on the study of thermal, structural, vibrational, compositional, and morphological changes of BHA from pig cortical bone obtained by a multi-steps process that includes calcination at two heating rates (2.5 and 5 °C/min), six annealing temperatures (600, 700, 800, 900, 1000, 1100 °C) for each one, and finally, cooling in air into the furnace; these experiments were realized using a controlled computer system. A transition disorder-order was found, as well as, increases in crystalline quality.

Keywords: Pig Bone, Annealing temperature, Crystalline quality

References:

Presenting author’s email: marioga@fata.unam.mx