

**LATVIJAS UNIVERSITĀTES  
76. STARPTAUTISKĀ KONFERENCE**

# **ĶĪMIJAS SEKCIJA**

Tēžu krājums

2018

# ANALYTICAL CHARACTERIZATION OF HYDROXYAPATITES

## HIDROKSILAPATĪTU ANALĪTISKĀ RAKSTUROŠANA

Vladlens Grebņevs<sup>1</sup>, Arturs Viksna<sup>1</sup>, Oskars Purmalis<sup>2</sup>,  
Liene Plūduma<sup>3</sup>

<sup>1</sup> Faculty of Chemistry, University of Latvia, Jelgavas Street 1, Riga, LV-1004, Latvia

<sup>2</sup> Faculty of Geography and Earth Sciences, University of Latvia, Jelgavas Street 1, Riga, LV-1004, Latvia

<sup>3</sup> Biomaterials Research Laboratory, Riga TU, Paula Valdena Street 3/7, Riga, LV-1048, Latvia

E-mail: vladgrebnev36@gmail.com

Due to a tendency of rapid ageing of population taking place nowadays in several countries, an increasing demand for orthopedical implant development with improved properties appears. Calcium phosphates (mainly hydroxyapatite – HAp), being similar to a chemical structure of human bone inorganic constituents, are mostly recognized biomaterials for bone and teeth renewal. HAp-based biomaterial major advantages are high biocompatibility, osteoconductivity and non-toxicity.

One of the most essential parameters characterizing HAp is Ca/P ratio. It primarily depends on synthesis conditions such as pH, stirring and reagent addition rate. Practice shows that properties of commercially available HAp tend not to match with those defined by the manufacturer, also the information about the product may be indistinct and imprecise. Furthermore, in case of synthesized HAp, several unexpected deviations from normal reaction progress periodically occurs.

A lack of information about complete HAp composition makes it impossible to obtain high quality implants. Stoichiometry mismatch is often accompanied by HAp unpredicted properties after high temperature treatment what results in changes of thermal stability. In order to prevent appearance of HAp-based material defects, Ca/P ratio must be strictly controlled [1].

In this research for determination of HAp Ca/P ratio X-ray methods (TXRF, PXRD, WDXRF), atomic absorption spectroscopy and gravimetry were used. Accuracy, sensitivity and suitability for HAp analysis of selected analytical methods have been estimated as well as conclusions about their potential in routine analyses have been made.

### Reference:

- [1] Demirchan, A. C. Hydroxyapatite: Synthesis, Properties, and Applications. *Nova Science Publishers*. 2012, 7–11.