INTERNATIONAL CONFERENCE ON

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POSTER SESSION I 1st December 16:00 – 17:30		
P01	Afonina Anastasija	Low-Temperature Synthesis of Iron Doped Whitlockite Powders
P02	Aukštakojytė Rūta	Synthesis and Structural Characterization of Graphene Oxide and Thermally Reduced Graphene Oxide
P03	Bastakys Lukas	Structural and Tribological Properties of Ceramic Coatings Deposited by Plasma Spraying
P04	Beklešovas Benas	Chromium Oxide Synthesis by Reactive Magnetron Sputtering and Investigation
P05	Bilvinaitė Goda	A Micro-Computed Tomographic Evaluation of Single Cone Root Canal Fillings Performed by Undergraduate Student, Postgraduate Student, General Practitioner and Endodontist
P06	Bodylska Weronika	Bioactive Glass: Comparative Study on Particles with Different Sizes
P07	Budrevičius Darius	The Dependence of the Morphology Of $GdPO_4$ on pH
P08	Buzaitytė Eglė	Synthesis of $LaPO_4$:1%Eu Nanorods by Hidrothermal Method
P09	Diliautas Ramūnas	Preparation and Characterization of $Bi_{1-x}Gd_xFe_{0.85}Mn_{0.15}O_3$ Solid Solutions
P10	Dolmantas Paulius	Modified Maxwell-Garnett Mie Effective Medium Formulation for Investigation of LSPR in DLC:Ag Nanocomposite Thin Films
P11	Drobysh Maryia	The Development of Electrochemical-Based Immunosensor for SARS-CoV-2 Detection
P12	Dukstiene Nijole	SEM/EDS and XRD Studies of Ag-Cd-Se Thin Films Deposited on Polyamide 6
P13	Gabriūnaitė Inga	Phospholipid Membrane Formation on Fluorine Doped Tin Oxide for Biosensing of Toxins
P14	Gaidamavičienė Giedrė	Various Aqueous Synthesis Methods and Characterization Techniques for Nanocrystalline Calcium Molybdate as a Antimicrobial Component
P15	Griesiute Diana	Hydrothermal Synthesis of Copper-Containing Calcium Phosphate with Whitlockite Structure
P16	Griniuk Evelina	Influence of Synthesis Conditions on Formation Tungsten Oxide Thin Films
P17	Halubek-Gluchowska Katarzyna	Bioactivity and Optical Properties of SiO_2–CaO Glass Doped with Tm^{3+}/Yb^{3+} Ions
P18	Yang Chang Jen	Effect of Gamma-Polyglutatamic Acid/Nano-Hydroxyapatite (γ-PGA/Nano-HAp) Paste on Rehardening and Prevention of Surface Etched Enamel
POSTER SESSION II **2nd December 16:00 – 17:30**		
P19	Inkrataitė Greta	Determination of Different Garnet Films Characteristics Prepared Using Sol-Gel and Spin or Dip-Coatings Techniques
P20	Ivanets Andrei	Synthesis and Crystal Structure of Magnesium Ferrites Doped by Lanthanids
P21	Jonaitytė Eglė Marija	Evaluation of Microarchitecture and Collagen Coating of Regular and Irregular Structure 3D Polycaprolactone Scaffolds for Dental Pulp Tissue Regeneration

Hydrothermal Synthesis of Copper-Containing Calcium Phosphate with Whitlockite Structure

D. Griesiūtė, A. Kizalaitė, H. Klipan, A. Žarkov
Institute of Chemistry, Vilnius University, Naugarduko g. 24, LT-03225, Vilnius, Lithuania
diana.griesiute@chgf.vu.lt

ABSTRACT

Calcium phosphates are the main inorganic constituents of human hard tissues (bones and teeth) and play an essential role in human life [1]. Despite the fact that magnesium whitlockite ($Ca_{18}Mg_2H_2(PO_4)_{14}$) is the second most abundant mineral in human body, synthetic whitlockite is not so frequently used in practice for regenerative medicine purposes. One of the reasons is that its preparation is challenging and synthesis products often contain impurities. On the other hand, whitlockite is biocompatible, have excellent osteogenic properties and it is more stable in acidic conditions than other calcium phosphates. These properties make whitlockite a promising candidate for the use in damaged bone regeneration or dental application [2].

Partially substituted calcium phosphates can possess improved physical and biological properties, which makes possible to use them in a wider application area. Copper is an essential element in metabolism processes and copper-doped biomaterials are useful for orthopedic application. Copper-substituted calcium phosphates are well known for their antibacterial [3], angiogenic, and osteogenic properties, which stimulate biological integration of new materials. These biomaterials with low copper concentration are not toxic like antibiotics, which were widely used in the past years [4]. For this reason, we hope, that copper-containing whitlockite will be a future candidate in orthopedic surgery due to copper biological and antibacterial properties.

In the present work, whitlockite powders were synthesized by dissolution-precipitation method under hydrothermal conditions. The main goal of this work is to optimize synthesis conditions (pH, temperature, reaction time, concentration of starting materials) and obtain low crystallinity whitlockite powders. Also, to analyze whitlockite phase purity and structural changes at different copper amounts. The crystallinity, crystal structure and structural changes were evaluated by powder X-ray diffraction (XRD), Fourier-transform infrared (FTIR) and Raman spectroscopies. Scanning electron microscopy (SEM) was used for the characterization of morphological features of products. Chemical composition of synthesized powders was analyzed by inductively coupled plasma optical emission spectrometry (ICP-OES).

References:

1. N. Eliaz, N. Metoki, *Materials,* Calcium phosphate bioceramics: A review of their history, structure, properties, coating technologies and biomedical applications, 2017, 10(4), 334.
2. H. L. Jang, H. K. Lee et al. *Journal of Materials Chemistry B,* Phase transformation from hydroxyapatite to the secondary bone mineral, whitlockite, 2015, 3, 1342–1349.
3. S. Gomes, C. Vichery et al. *Acta Biomaterialia,* Cu-doping of calcium phosphate bioceramics: From mechanism to the control of cytotoxicity, 2018, 65, 462–474.
4. A. Jacobs, G. Renaudin et al. *Acta Biomaterialia,* Biological properties of copper-doped biomaterials for orthopedic applications: A review of antibacterial, angiogenic and osteogenic aspects, 2020, 117, 21–39.