CHARACTERISATION OF ZINC WHITLOCKITE SYNTHESISED UNDER HYDROTHERMAL CONDITIONS

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Magnesium whitlockite ($Ca_{18}Mg_2H_2(PO_4)_{14}$) is one of the major mineral components of human body constituting to approximately 20–35 wt% of human hard tissue [1]. This compound is known for its excellent biocompatibility and osteogenic capability, which makes this material a promising candidate for application in bone regeneration [2]. Incorporation of biologically active ions into the whitlockite structure could result in superior biological performance and expanded clinical application of the material. One of the potential substituents in whitlockite is Zn which can enhance the rate of metabolic processes and give antibacterial properties to calcium phosphates [3]. These properties can accelerate bone regeneration processes and decrease the infection rate.

In the present work, whitlockite powders were synthesised using hydrothermal synthesis method using calcium hydrogen phosphate dihydrate and zinc acetate dihydrate as starting materials. Synthesis was performed at 200 °C temperature for 3 h. Pure-phase whitlockite powders containing Zn ions were successfully obtained although it was demonstrated that amount of Zn in the final compound could only be varied in a very narrow range. Synthesised compounds were characterized using X-ray diffraction (XRD), inductively coupled plasma optical emission spectrometry (ICP-OES), Fourier-transform infrared spectrometry (FTIR), Raman spectroscopy and X-ray photoelectron spectroscopy (XPS).

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References

1. H. Cheng, R. Chabok et al. Acta Biomaterialia. **69 (**2018) 342-351.
2. H. L. Jang, G. Bin Zheng et al. Advanced Healthcare Material. **5 (**2015) 128-136.
3. I. V. Fadeeva, M. R. Gafurov et al. BioNanoScience. **7 (**2017) 434-438.