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SYNTHESIS OF LOW CRYSTALLINE CALCIUM DEFICIENT HYDROXYAPATITE GRANULES

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Calcium phosphate (CaP) based biomaterials have received great interest since they are widely applied for the replacement of diseased or damaged mammalian hard tissues [1-5]. Due to similarity to the inorganic component of natural bone synthetic CaP materials show excellent biological properties in a physiological environment. Currently these artificial bone substitutes are prepared in a form of powders, granules, dense or porous scaffolds, and bioactive coatings on metal prosthesis [6]. Numerous synthesis techniques of CaPs at elevated temperatures have been revealed. However the resulted ceramics exhibit extremely high crystallinity far from natural bone. Consequently, when biomaterial implanted in body it remains in its initial form for the long time. Yet low crystalline material is easier to integrate by surrounding bone tissue during the bone regeneration process [7].
The objective of our study, therefore, was to develop a simple and cost-effective synthesis route for the preparation of low crystalline calcium deficient hydroxyapatite (CDHA, with the formula $Ca_9(HPO_4)(PO_4)_5OH$) using a precursor granules. We selected calcium sulphate hemihydrate as starting material. To fabricate CDHA granules we utilized a method based on an incessant dissolution-precipitation reaction eventually resulting in a solid and shaped material consisting of desired phase (Fig. 1).

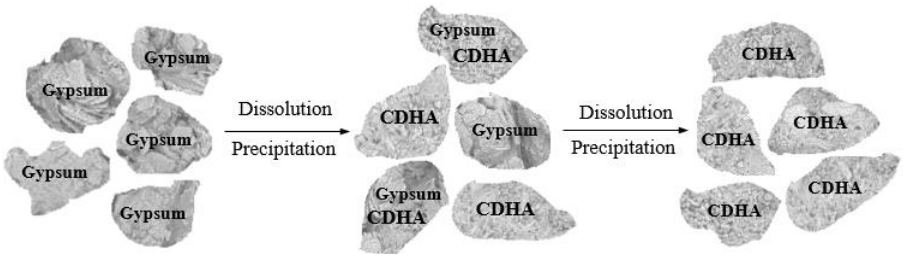

Fig. 1. Schematic representation of dissolution-precipitation reaction.

The monophasic calcium deficient hydroxyapatite granules were synthesized by three slightly different preparative approaches and compared. The obtained synthesis products were characterized by Fourier transformed infrared spectroscopy (FTIR), X-ray diffraction analysis (XRD) and scanning electron microscopy (SEM).

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