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FABRICATION OF MAGNETIC PATTERNS BASED ON HYDROXYAPATITE

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One of the most important goals in material engineering is to develop functional biomaterials based on specific control of molecular building blocks. Thus, obtaining of magnetic patterns based on hydroxyapatite (HA) are of interest. The patterns were synthesized in hydrogel matrix using calcium chloride and iron chloride as inner solutions. The effect of Fe^{3+} hydrolysis on the hydroxyapatite formation has been studied.

Introduction.

Hydroxyapatite (HA), main component of bone-tissue, is one of the most perspective materials because of its properties. This material is already used to create dental implants [1]. It is also used as the main component of powders for 3D printing of ceramic products applicable in medicine [2]. The deposition of hydroxyapatite Liesegang ring (LR) in the agar matrix is of interest due to the similarity of the hydroxyapatite formation with the bone tissue growth in humans [3]. The magnetic field and nearby ions can also influence bone growth [4]. In this regard, the aim of our study is to obtain HA magnetic patterns and study the processes occurring during the formation of HA in the presence of iron ions. Using of iron chloride solution give us possibility to penetrate agar gel and change the structure formation.

Main part.

The HA LRs are obtained in tubes and Petri dishes. The sodium phosphate at a concentration of 0.02 mol/L was added into 0.4 wt.% agar solution. The 1M calcium chloride solution was poured on solidified agar gel. After structures formed, a 100 mL of 1M $FeCl_3$ was dropped in the system. Due to the iron chloride hydrolysis, the pH value of medium is acidified, and HA patterns dissolve. The released Ca^{2+} and PO_4^{3-} ions diffuse farer and form the new LR structure at the distance. The XRD analysis of obtained crystals was carried out.

Conclusions.

The phase compositions of the resulting structures have been investigated. The iron (III) ion is found to influence on HA formation in agar gel.

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