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Porous bioceramics based on substituted magnesium phosphate with a tailored architecture for bioimplantation

Wednesday, 28th October: Stereolithography II - Oral - Abstract ID: 194

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Reconstructive surgery and orthopedics need a new generation material for bone replacement and grafting with a personalized architecture. The aim of this study is to develop resorbable bioceramics based on substituted magnesium phosphate with a tailored pore space architecture created by the method of stable layer-by-layer 3D printing from a light-cured suspension for personalized bone-tissue engineering. Substitution of magnesium phosphates ceramic with alternative cations, such as calcium, coupled with condensed phosphate ions plays a significant role in the bone remodeling process, affecting the early-stage of bone regeneration through stimulating osteogenic differentiation, prohibiting osteoclastic activity, and transforming into mechanically enhanced hydroxyapatite bone tissues. Osteoconductivity of the implants and sufficient strength are also achieved by obtaining a macroporous material with a specific architecture (gyroid and Kelvin), in which up to 80% of the total volume is connected pores. For these bioceramics, the composition of suspension for DLP-printing is revealed, rheological, mechanical and toxicological tests are carried out and in vivo study is done. RFBR partially supported this study under Grant No. 19-38-90274, 18-29-11079.