

The tendency of crystallization of bioactive borate glasses

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The successful development of reconstructive surgery, orthopaedics, dentistry, and many other fields of medicine is largely determined by the achievements in medical materials science. The search for new materials and their application must be combined with the necessary mechano-chemical properties with biocompatibility or biological activity in living tissue. Ceramic materials are durable and resistant when working in very harsh conditions, unlike others, and no changes such as dissolution and loss of properties occur in the living organism. Ceramic materials have chemical stability. They are characterized by a very slow course of side reactions. Bioceramics belong to the large and very diverse group of biomaterials, and they often prove indispensable when it is necessary to permanently or temporarily exchange elements of the human support system. Ceramic materials are used to restore or reconstruct diseased or damaged parts of a person's musculoskeletal system.

Among this large group of materials, bioactive glasses and glass-ceramics are of considerable interest.

In this connection, conventional bioactive borate glasses in the $B_2O_3/Na_2O/MgO/CaO/P_2O_5$ system are synthesized by melt-quenching technique. Further crystallization is applied. The obtained glass-ceramics are investigated by powder X-ray diffraction method, FT-IR spectroscopy, scanning electron microscopy, and EDX. The main structural units, i.e. BO_3 , BO_4 , PO_n , are studied and the correlation between the structure and the hydroxyapatite (HA) production in simulated body fluid (SBF) had been discussed.