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Multifunctional Bioactive Glasses for Tissue Regeneration: Compositions Modified with Strontium Oxide

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The complexity in designing brand-new compositions as 45S5 Bioglass® is mainly due to the fact the more components you have, the more difficult it is to trace the relationship between composition, structure and bioactivity. Also, the properties of bioactive compositions should reflect directly their ability to release a critical amount of different ions in the surrounding host material, creating or not favorable conditions for the cellular processes. The present research was conducted by modifying the glass network of 45S5 by adding Al₂O₃ and SrO in order to obtain a multifunctional glass for biomedical applications, i.e. a not only with bioactive properties as osteoinductive and also biocidal. Three series of compositions were produced to optimized the amounts of both oxides, thus, minimizing undesirable effects and enhancing the mobility of Ca²⁺ cations due to the rearrangement of the glass network. The samples were obtained by melting (1500°C) and quenching and characterized by X-ray diffraction (XRD), differential thermal analysis (ATD), Fourier transform infrared (FTIR) and Raman spectroscopy. The initial results indicates that the vitreous network is predominantly of Q₃ arrangements in detriment of the typical 45S5 Q₂ structure. And, the FT-IR and Raman spectra are similar to glasses with adequate solubility and bioactivity for the interaction between the implant and the host.

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Analogies between Ferritin Biomineral Core in Different Organs for Neurological Disorders

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