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NEW BIOACTIVE MATERIALS OBTAINED USING AS RAW THE MINERALS DEPOSITS OF CUBA

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The main problem with the implant used until 70s, e.g. metals and polymers was that they were designed to be bioinert, triggered fibrous encapsulation after implantation, rather than forming a stable interface or bond with tissues. In this context, bioceramics such as alumina or zircona are the traditional examples of bioinert ceramics because elicits minimal interaction with its surrounding tissues. Nevertheless bioactive ceramics are represented by variations on bioactive glasses, glass–ceramics and ceramics such as synthetic hydroxyapatite and other calcium phosphates. The first bioactive glass discovered with the ability to bond chemically to the living bone was a silica-based glass from CaO-SiO2-P2O5-Na2O system tested in 1969 by Hench and colleagues termed as 45S5 Bioglass®. Multiples studies have been develop new formulations of glasses and glass-ceramics materials from the original composition. This work is aimed to develop a bioactive glass based on CaO-SiO2-Na2O system using as source materials the mineral deposits of Cuba. The glass composition used in this work was prepared using natural raws (silica sand and calcite) deposits owing to the Pinar del Rio and Mayabeque provinces respectively in Cuba. Raw materials were used in the following proportions: silica sand 53 wt.%, calcite 23 wt., sodium carbonate 24 wt.% and water 4-5 wt.%. Sample was heated in air to expel the decomposition gases and finally heated until 1400 °C for 6 hours. The melts were quenched and annealed to remove residual stress. The sample name was BVCombeite because of its composition was very close to the zone of combeite phase (Na2O.2CaO.3SiO2) in the ternary diagram. The chemical composition of the glass obtained was SiO2 (52.1 wt.%)-CaO (22.6 wt.%)-Na2O(23.3 wt.%) and resulted very similar to the nominal composition. The diffraction patterns revealed that a crystalline phase identified as Na2O.2CaO.3SiO2 was formed after annealed. The differential thermal analysis determined that Tg value is 560 °C. The in vitro study revealed that the BVCombeite glass exhibited nucleation and growth of Ca/P layer at their surface after immersed in SBF for 15 days. The results suggested that this glass could be appropriated for biomedical applications. Palavra-chave: silica-rich glasses, mineral deposits, bioactivity.