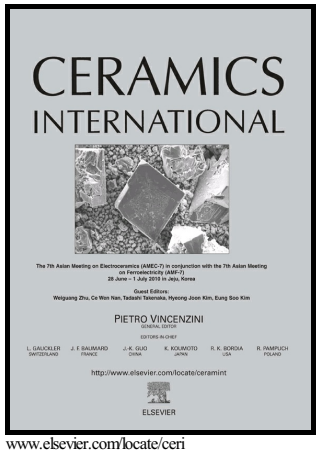

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Abstract

In the current study, the biocompatibility and mechanical characteristics of glass-infiltrated zirconia were improved via a simple composite coating made of Zn-doped hydroxyapatite (ZnHA) ceramic and a silicate-based glass. During thermal treatment, significant reaction and crystallization occurred and some of the ZnHA was transformed into β-tricalcium phosphate, calcium oxide phosphate, and calcium zirconium oxide. Moreover, the glass crystallised into a sodium calcium aluminium silicate phase. The mechanical properties were investigated and the results indicated that the amount of glass in the composite and in the glass-infiltrated zirconia layer strongly affected the flexural strength and adhesion of the coating layer. The composite coatings on the glass-infiltrated zirconia displayed better mechanical properties than the pure ZnHA coating due to the newly formed crystalline phases. Murine pre-osteoblastic (MC3T3-E1) cells adhered to and spread well on the composite coating surfaces. The cell viability results revealed that the glass/ZnHA composites demonstrated a superior bioactivity of osteoblast cells compared to uncoated zirconia. These results show that the glass/ZnHA composites on the glass-infiltrated zirconia structure are suitable for use as hard tissue