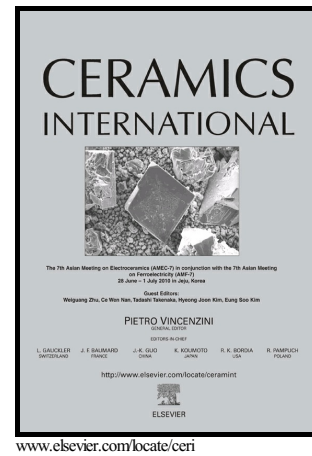


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Bioactive glass-ceramics prepared by powder sintering and crystallization of polyphosphate glass containing strontium

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Abstract

Melt-quenching method was employed for obtaining a glass-ceramic with the following composition $42\text{P}_2\text{O}_5 \cdot 40\text{CaO} \cdot 5\text{SrO} \cdot 10\text{Na}_2\text{O} \cdot 3\text{TiO}_2$ (mol %) glass. The crystallization and sintering behavior of glass have been studied by using DTA, HSM, XRD, FTIR and SEM methods. It was determined that the surface and volume crystallization mechanisms act simultaneously in bulk glass samples. The comparison of DTA and HSM data revealed that the sintering and crystallization processes are independent. The sintered calcium phosphate glass-ceramic which contained bioactive $\beta\text{-Ca}_3(\text{PO}_4)_2$ and $\beta\text{-Ca}_2\text{P}_2\text{O}_7$ phases was successfully prepared. It was determined that during crystallization the primary phase in the precipitate was $\beta\text{-Ca}(\text{PO}_3)_2$. Other phases appearing in the resulting glass-ceramic were: $\alpha\text{-Ca}_2\text{P}_2\text{O}_7$, $\gamma\text{-Ca}_2\text{P}_2\text{O}_7$, $\text{Ca}_4\text{P}_6\text{O}_{19}$ and $\text{CaHPO}_4(\text{H}_2\text{O})_2$. Crystalline phases containing Sr and Ti were not detected. SEM analysis of the glass-

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