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**Improvements in phase stability and densification of  $\beta$ -tricalcium phosphate bioceramics by strontium-containing phosphate-based glass additive**

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**Abstract**

$\beta$ -tricalcium phosphate ( $\beta$ -TCP), which transforms to  $\alpha$ -TCP at around 1125 °C, is characterized by poor sinterability. In this study, for the first time strontium-containing phosphate-based glass (SPG) was used as a sintering additive for  $\beta$ -TCP, which was sintered at 1250 °C. The results indicated that the SPG additive allowed for liquid-state sintering of  $\beta$ -TCP, thereby noticeably promoting the densification of  $\beta$ -TCP bioceramics. In the sintering process SPG reacted with  $\beta$ -TCP, and the metal ions from SPG were substituted for the calcium ions of  $\beta$ -TCP. The SPG additive effectively inhibited the phase transformation of  $\beta$ -TCP to  $\alpha$ -TCP in the bioceramics. The compressive strength of porous  $\beta$ -TCP bioceramics was markedly increased by introducing 10 wt.% SPG. The SPG is considered as an effective sintering additive to improve the phase stability and mechanical strength of porous  $\beta$ -TCP bioceramics.

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