

Co-sintering of hydroxyapatite and bioglass: comparison between conventional sintering, Spark Plasma Sintering (SPS) and Ultra-fast High Temperature Sintering (UHS)

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Co-sintering presents challenges when combining materials with markedly different chemical compositions and physical properties. In particular, the formation of secondary phases or discrepancies in thermal expansion may lead to failure.

Hydroxyapatite (HA) is known to provide excellent osteoconductivity and chemical affinity to bone but exhibits limited mechanical strength and may transform to tricalcium phosphate (TCP) at elevated temperatures. As an alternative to HA, 45S5 Bioglass® triggers rapid bioactivity and bonding to tissue yet shows low intrinsic strength and tends to devitrify during thermal exposure, narrowing its processing window. Coupling both is considered to combine mechanical performance and bioactivity.

Co-sintering, however, can fail due to dissimilar thermal expansion, viscous flow behavior of the glass, crystallization kinetics, and interfacial reactions that can destabilize HA.

In this study, we compare co-sintering of these materials by conventional sintering, Spark Plasma Sintering (SPS), and Ultra fast High Temperature Sintering (UHS). The study includes microstructural observations along with dilatometry characterizations.

Professional Status of the Speaker

Postdoc

Interest in submitting a paper in a special issue of

Advanced Engineering Materials (Wiley)

Invitation letter for visa

No

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