

Enhancement of Mechanical and Biological Properties in Wollastonite Bioceramics by MgSiO₃ Addition

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Abstract : Strong and biocompatible wollastonite (CaSiO₃) was fabricated by pressureless sintering at temperature range of 1250~ 1300 °C and phase transition of to β -wollastonite with an addition of MgSiO₃. Starting pure α -wollastonite powder were prepared by solid state reaction, and MgSiO₃ powder was added to α -wollastonite powder to induce the phase transition α to β -wollastonite over 1250°C. Sintered wollastonite samples at 1250°C with 5 and 10 wt% MgSiO₃ were α + β phase and β phase respectively, and showed higher densification rate than that of α or β -wollastonite, which are almost the same as the theoretical density. Hardness and Young's modulus of sintered wollastonite were dependent on the apparent density and the amount of β -wollastonite. Young's modulus (78GPa) of β -wollastonite added 10 wt% MgSiO₃ was almost double time of sintered α -wollastonite. From the in-vitro test, biphasic (α + β) wollastonite with 5wt% MgSiO₃ addition had good bioactivity in simulated body fluid solution.

Keywords : β -wollastonite, high density, MgSiO₃, phase transition

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