

SHS Processing of CoTi Porous Scaffolds for Bone Graft Substitutes

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ABSTRACT

An artificial bone graft acting as a scaffold for bone tissue ingrowth must be biocompatible and should have interconnected pores in the range of 200-500 μm . While the inadequate mechanical properties of calcium phosphate ceramics currently used as bone graft substitutes limit their use to nonload-bearing body locations, porous biocompatible metals and intermetallics are sufficiently strong to be used for filling large defects in highly loaded long bones. Porous NiTi intermetallic (Nitinol) scaffolds fabricated by SHS wave have already reached the stage of pre-clinical evaluation, however their high content of toxic, carcinogenic and allergenic Ni and its possible release into the body fluids has aroused concern in the medical community. In this work, the combustion synthesis of a more biocompatible porous CoTi intermetallic is reported. The pore structure of the SHS-fabricated CoTi specimens meets the requirements of pore size and distribution of metallic scaffolds intended for bone tissue ingrowth. A proper choice of processing parameters allows one to synthesize porous CoTi with relatively high mechanical properties.