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Abstract

Titanium cylinders with radial graded porosity, which are potentially suitable for biomedical applications (replacement of cortical and trabecular bones involved in different joint and dental restorations), have been developed by a novel uniaxial and sequential compaction device, based on powder metallurgy techniques. The macrostructural, microstructural and mechanical properties of the cylinders were characterized. The microstructure obtained is a new bio-inspired/bio-mimetic approach to solving one of the most important drawbacks of titanium implants, i.e., bone resorption due to the stress-shielding phenomenon. In addition, the developed device has proved to have unique advantages in customizing the structural integrity in conventional powder metallurgy manufacturing in a simple, economic and reproducible manner.