The effect of microstructure on the mechanical properties of Ti Scaffolds

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Since decades, porous titanium and titanium alloy have many advantages as scaffolds in bone plants engineering, as they allow bone ingrowth within scaffolds and have low modulus value similar to real bones value. Implants with low young’s modulus have increased in demands that present the importance of manufacturing porous titanium to solve this issue. In the present project, Ti scaffolds with various porosities (55% and 70%) and vary pores size of (45-106, 106-212, 212-300, and 300-500µm) were prepared using powder metallurgy technique adopting ammonium carbonate as space holder. The investigations include the microstructure and the compressive deformation during the mechanical tests. Two types of pores were formed during preparation of porous Ti samples, open pores and closed pores with pore size related to the particle size of space holder. The pore size has low effect on the young’s value while the higher percentage of porosity has reduced young’s and the compressive strength of Ti scaffolds. This approach will help in developing easy controlled superelasticity by manipulating the pores characterizations and porosity of Ti scaffolds.