

## **Processing and Properties of Hydroxyapatite/(Ti-6Al-4V) Biomaterial Using Powder Metallurgy Technique**

M. M Dewidar and K. A. Khalil

Department of Mechanical Design and Materials, High Institute of Energy, Aswan, Egypt.  
dewidar5@hotmail.com

Calcium hydroxyapatite (HAp,  $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ) is one of the most important biocompatible materials with human bones and teeth. However, hydroxyapatite possesses low mechanical strength and fracture toughness, which is an obstacle to its applications. In this work, Hydroxyapatite / (0-80 wt %) (Ti-6Al-4V) were synthesized by wet-milling technique. The starting materials were a mixture of Hydroxyapatite nano-powder and Ti-6Al-4V micro-powders. The mixtures were optimized for good sintering behaviors, high toughness and hardness. The mixtures were cold compacted and sintered using conventional PM technique. Effects of the addition of Ti-6Al-4V and sintering temperature and on the toughness, hardness and microstructure properties have been studied. Sintered bodies with nearly theoretical density were obtained for addition up to 25 vol% hydroxyapatite, but the relative density decreased gradually with increasing hydroxyapatite content more than that. Compared with hardness and toughness obtained for pure hydroxyapatite, the hardness and toughness for hydroxyapatite with addition Ti-6Al-4V were much higher. The materials exhibited a homogeneous dispersion of Ti-6Al-4V which was achieved at nanometer and micrometer scales.