

전자빔 용해 방법으로 제조된 정형외과 임플란트용 Ti-6Al-4V 합금의 재료 특성 분석
 Material Characteristics of Ti-6Al-4V Alloy Manufactured by Electron Beam Melting for Orthopedic
 Implants

강관수^a, 정용훈^{a*}, 정태곤^a, 양재웅^a, 정재영^a, 박광민^a, 우수현^b, 박태현^b

^{a*}오송침단의료산업진흥재단 침단의료기기개발지원센터(E-mail: yonghoonj186@kbiohealth.kr)

^b(주)메디씨이 기업부설연구소

초 록: Electron beam melting (EBM) is one of powder based additive manufacturing technology used to produce parts for high geometrical complexity and directly with three-dimensional computer aided design (CAD) model. It is kind of the most promising methods with additive manufacturing for a wide range of medical applications, such as orthopedic, dental implant, and etc. This research has been investigated the microstructure and mechanical properties of as fabricated and hot iso-static pressing (HIP) processed specimens, which are made by an Arcam A1 EBM system. The Ti-6Al-4V titanium alloy powder was used as a material for the 3 dimensional printing specimens. Mechanical properties were conducted with EBM manufacturing and computer numerical control (CNC) machining specimens, respectively. Surface morphological analysis was conducted by scanning electron microscopy (SEM) for their surface, dissected plan, and fractured surface after tensile test. The mechanical properties were included tensile stress-strain and nano-indentation test as a analysis level between nano and macro. As following highlighted results, the stress-strain curves on elastic region were almost similar between as fabricated and HIP processed while the ductile (plastic deformed region) properties were higher with HIP than that of as fabricated processed.

Keywords : Additive manufacturing, Electron beam melting, Titanium, Orthopedic implants, Tensile strength, Nano-indentation

Acknowledgement

This work was supported by the Technological Innovation R&D Program (S2519931) funded by the Ministry of SMEs and Startups(MSS, Korea)