

**DIFFUSION BONDING OF TI-6AL-4V WITH TI-6AL-4V
FOAM TO IMPROVE THE IMPLANT-BODY
INTERFACE**

By

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Currently, hundreds of thousands of medical devices are implanted into patients each year and, with an increasingly active population, patients are receiving orthopedic implants at younger ages. To avoid loosening and subsequent removal, porous surface structures are presently being developed to improve osseointegration and longevity. An alternative approach to existing surface treatments is to attach metallic foams directly onto bulk implant materials. A series of tensile test specimens with embedded metallic foam were fabricated to assess the feasibility of this approach. The Ti-6Al-4V foam was diffusion bonded onto the Ti-6Al-4V bulk material using a thermo-mechanical simulator in an argon atmosphere at temperatures between 900°C and 950°C for times between 45 minutes and 75 minutes. These specimens were mechanically tested to determine bond quality and subsequently characterized using light optical microscopy (LOM) and scanning electron microscopy (SEM). The structural integrity of the metallic foam was also evaluated.