

Investigate of Bone Growth around Implants of Additive Manufactured Ti-6Al-4V Doped Ceramics

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Additive manufactured pedicle screw of Ti-6Al-4V doped ceramics is fabricated via selective laser melting (SLM), which is found to own better mechanical properties in both strength and ductility. To investigate the biomechanical response in a pig model implanted with this metal-ceramic compound, we conduct Transmission X-ray Microscopy (TXM) to distinguish and quantify new bone and mature bone growth. Sanderson's Rapid Bone Stain (RBS) technique for the staining of ground section histology is utilized as the standard method to assess the mineralized mature bone growth in comparison with TXM. The 3D printed Ti-6Al-4V doped ceramic exhibits more pronounced volumes of osseous adaption compared to the 3D printed Ti-6Al-4V, suggesting promising additive manufactured metal matrix composites in promoting bone growth and osseointegration.

Keywords – 3D-Printed, Ti-6Al4, Transmission X-ray Microscopy (TXM), RBS.