

Elemental Diffusion Behaviour of Biomedical Grade Titanium Alloy Through Thermal Oxidation

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Abstract: Major issues related to implant failure are wear debris and metal ions release where Titanium-Aluminium-Niobium alloys still face those problems despite of better biocompatibility. Surface modification is one of the alternatives in order to reduce those wear as well as ion release problems to the host tissue. In this study, experiments were carried out to investigate the element diffusion behaviour of Ti-6Al-7Nb alloy through thermal oxidation in order to obtain coating on the

different durations 6, 12 and 24 hours. It is found that at prolong time, Niobium diffusion occurs where short duration Aluminium dominates. This suggests that longer heating time promotes heavy metal diffusion by restricting diffusion of light metal and hence, dominates the heavy metal oxide layer formation. The oxide layer formed on the substrate may lead to increase the lifespan of the implant and reduces the harmful effects caused by wear debris or toxic ion from metal alloys.