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Rhodium Enhances the Corrosion Resistance of Titanium Surgical Implants

One of the most important properties required of a material to be implanted in the human body is long term biocompatibility; another is resistance to corrosion in the biological environment. A number of physical properties such as good ductility and workability, low density and low elastic modulus are also necessary. Titanium and titanium-6 per cent aluminium-4 per cent vanadium satisfy these requirements, and have been used as surgical implant materials. In mechanically and electrically static conditions, the corrosion rates of these materials in the biological environment are low, but still finite. Thus metal ions are released continuously and may concentrate in the tissues. The long term effects of this are not fully understood but there is some concern, particularly about the effects of aluminium and vanadium present in the alloy.

For this reason efforts are being made to develop new materials with superior properties. Corrosion is essentially a surface phenomenon, so if a material has suitable mechanical properties, it is unnecessary to change the bulk properties by bulk alloying. An improvement may be achieveable by increasing the resistance to corrosion of only the surface layer.

Initial results of biocorrosion studies of rhodium and gold implanted into titanium and a titanium alloy, respectively, when tested in non-passivating acid and in passivating saline solutions of the type used to simulate the environment encountered by surgical implant materials, have been published recently (I.-S. Lee, R. A. Buchanan and J. M. Williams, *Mater. Res. Symp. Proc.*, 1989, **110**, 687–695). Commercially pure titanium implanted with rhodium showed long term improved corrosion resistance in 1N sulphuric acid solution, as a result of preferential dissolution of titanium and a related build-up of rhodium. The rhodium-enriched surface was also stable in saline solution.

Contaminated Washcoatings

Please note that in the paper entitled "The Effect of Fuel and Oil Additives on Automobile Catalyst Performance" which appeared in *Platinum Metals Rev.*, 1990, **34**, (1), 16–24, the two parts of Figure 3 were transposed. As is apparent from the P_2O_5 profiles, the test oils with high phosphorus contents appeared on the left of the page, as **a**, instead of on the right as **b**. Any confusion caused is regretted.