

## [IV~2]

### Surface Modification of Titanium Based Biomaterial by Ion Beam

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#### Abstract

Ion beam technique is just recently applied to improve the surface properties of biomaterials. In this paper Plasma Source Ion Implantation (PSII) and Ion Beam Enhanced Deposition (IBED) were employed to improve titanium based biomaterial. An attempt was made to obtain the relationship between microstructure of modified surface layer and biocompatibility.

It is shown that after PSII-N<sup>+</sup> implantation the blood compatibility (in vitro experiments) of titanium alloy has been improved obviously. The formation of titanium oxide film on the surface and of TiN in the N<sup>+</sup> implanted layer plays an important role to improve blood compatibility. IBED was further adopted to synthesize biocompatible titanium oxide film. Structure characteristics of titanium oxide layer were investigated by RBS, AES and X-ray diffraction. Glass, titanium alloy, low temperature isotropic pyrolytic carbon and mutual film coated titanium were adopted as reference materials to determine anticoagulation properties of IBED synthesized oxide films. The results showed that in certain synthesis condition the anticoagulation property is improved significantly and is better than that of all reference materials. The mechanism of anticoagulation of TiO<sub>2</sub>/TiN coating was discussed.

Ion beam technique may open a very important novel application due to its advantages of exact control and adjustment conditions for the surface modification.