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Synthesis and Properties of Ti-O/Ti-N Duplex Film Containing Ta*

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Titanium dioxide / titanium nitride duplex films containing Tantalum were synthesized on titanium and silicon wafer by magnetron sputtering deposition and then treated by thermal oxidization. The structure and composition were detected by X-ray photoelectron spectroscopy (XPS), and X-ray diffraction (XRD). The interaction of the material with blood was investigated by platelet adhesion. And the mechanical behavior was studied by the measurement of hardness and wear resistance. The results showed that rutile structure of TiO₂ was obtained in the surface layer, and tantalum was existed in a valence state of Ta⁵⁺. The investigation of behavior of platelet adhesion on the films was much better than that on Low Isotropic Pyrolytic Carbon (LTIC). The results of mechanical property experiments showed that microhardness and wearability of the films were improved with the doping of tantalum. In addition, the mechanism of the behavior of blood compatibility of Ta⁵⁺doped film was discussed, and the semi-conductivity of the film was thought to be a factor to effect the blood compatibility.

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