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# The mechanical compatibility and corrosion resistance of the titanium oxide film for vascular stent modification

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## Abstract

Vascular stent has been an effective therapy for coronary artery disease. But until now stents properties is far from ideal, the thrombogenic and in-stent restenosis sometime happen. Drug eluting stents (DES) have been shown to be effective in decreasing restenosis to a low level. However until now the complication of thrombosis for DES has still remained to some extent, even if anticoagulants have been taken by patients. It has been pointed out that the stent material (316L stainless steel or CoCrMo alloy), which will contact with blood when DES drug layer completely eluted, might be a main factor in influencing the propensity of thrombosis. So we need to develop new ideal stent. It must have excellent blood compatibility and not react with blood. And then it have good mechanical properties, such as fatigue, strength, and flexible. Then it also must have good corrosion resistance for decreasing harmful metal ion release. As we know that the stents contact with blood, so the surface properties of the stent play important effect on stents properties. And the understanding the interface process of the stents materials and the blood, tissue have important scientific value. Base on this understanding, the surface modification has been considered as the effective way to improve the performances of stents. In our previous work, we have synthesized Ti-O film with different microstructure and composition, the chemical, physical and biocompatibility of the Ti-O film were studied. The Ti-O film with excellent biocompatibility was fabricated in our lab. In this work, the titanium oxide was used to modify the stents by plasma immersion ion implantation and deposition. The investigation of the behavior of mechanical compatibility, corrosion resistance and blood compatibility of the Ti-O film coated stent were performed. The results show that PIIIID Ti-O film has excellent adherence, fatigue and corrosion resistance. The Drug eluting stents (DES) with Ti-O film pre-coated have lower restenosis and thrombosis generation, comparing with DES without Ti-O film. PIIIID Ti-O film surface modification is an attractive novel process for improving blood compatibility of stents.

**Keywords:** mechanical compatibility, corrosion resistance, Ti, O film, vascular stent, blood compatibility

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