

Effect of nano-titanium hydride on formation of multi-nanoporous TiO₂ film on Ti

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Abstract

The effect of titanium hydride on the formation of nanoporous TiO₂ on Ti during anodization has been investigated by X-ray photoelectron spectroscopy, grazing incident X-ray diffraction, transmission electron microscopy and scanning electron microscopy. Titanium hydride (TiH₂) was formed after cathodization, profoundly impacting the formation of nanoporous TiO₂ on Ti by anodization. Oxide layer and nanocrystal structure were observed after anodization with cathodic pretreatments. A multi-nanoporous TiO₂ layer was formed on the titanium. The titanium hydride is a nanostructure. The nanostructure is directly changed to nanoporous TiO₂ by a dissolution reaction during anodization. The nanoporous layer is difficult to form without cathodization. The nanostructural TiH₂ is important in forming a nanoporous TiO₂ layer. Anodization treatment with cathodic pretreatment not only yields a titanium surface with a multi-nanostructure, but also transforms the titanium surface into a nanostructured titanium oxide surface.