

Growth and characterization of tubular oxide layers on Ti substrates

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Since the report on the electrochemical formation of nano-tubular oxide layers on titanium alloys in fluoride containing electrolyte by Zwilling et al. in 1999, the formation of tubular oxide layers on various valve metals and their alloys[1, 2] has been extensively studied. Especially, intense attention has been paid on tubular titanium oxide layers due to a wide range of applications. As a result, it has revealed that the morphology of the oxides can be tuned by tailoring electrochemical conditions, in particular, electrolyte composition strongly affects the growth of tubular oxide layers. For examples, tubular titanium oxide layers are grown up to several hundred nanometers in acidic aqueous electrolytes whereas in neutral electrolytes the length of nanotubes reaches several micrometers. Furthermore tubular oxide layers with the thickness of a few hundred micrometers can be achieved in organic electrolytes.

In the present work we examine the growth and characterization of tubular oxide layers on titanium substrates subjected to heat treatment and cold working.

References

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