

Self-organized nucleation layer for the formation of ordered arrays of double-walled TiO₂ nanotubes with temperature controlled inner diameter

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Abstract

It is proposed to use the variation of the electrolyte temperature to fabricate titania nanotubes with variable inner diameter at a constant outer diameter and an invariable package density. The anodization of Ti sheets in an ethylene glycol and HF containing electrolyte is found to allow the preparation of nanotubes with the inner diameter controlled in the range from 10 nm to more than 250 nm through the change of the electrolyte temperature from $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$. The peculiarities of the anodization process performed at low electrolyte temperatures are discussed.