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Fabrication and structural characterization of highly ordered titania nanotube arrays HONGTAO SHI, Department of Physics and Astronomy, Sonoma State University, Rohnert Park, CA 94928, ROSITA ORDONEZ, Department of Physics and Astronomy, Sonoma State University — Titanium (Ti) dioxide nanotubes have drawn much attention in the past decade due to the fact that titania is an extremely versatile material with a variety of technological applications. Anodizing Ti in different electrolytes has proved to be quite successful so far in creating the nanotubes, however, their degree of order is still not nearly as good as nanoporous anodic alumina. In this work, we first deposit a thin layer of aluminum (Al) onto electropolished Ti substrates, using thermal evaporation. Such an Al layer is then anodized in 0.3 M oxalic acid, forming an ordered nanoporous alumina mask on top of Ti. Afterwards, the anodization of Ti is accomplished at 20 V in solutions containing 1 M NaH_2PO_4 and 0.5% HF or H_2SO_4, which results in the creation of ordered titania nanotube arrays. The inner pore diameter of the nanotubes can be tuned from ˜50 nm to ˜75 nm, depending on the anodization voltage applied to Al or Ti. X-ray diffractometry shows the as-grown titania nanotubes are amorphous. Samples annealed at different temperatures in ambient atmosphere will be also reported.

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