Formation and Characterization of Double-Walled TiO2 Nanotubes

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The presentation demonstrates the structures of self-organized high aspect ratio titanium oxide nanotube layers in non-aqueous fluoride-containing electrolytes.

Morphology and chemical composition of the tubular layers are affected by the electrochemical parameters such as type of the electrolyte (aqueous, organic), water content, anodization voltage.[1,2] The crystallization temperature and thermal annealing rate influence the structure and morphology as well. We found that anodically grown TiO_2 nanotubes have double-walled structure – inner and outer shells. The two shells can either be separated or fused together using different thermal annealing treatments. Highly regular and robust TiO_2 membranes can be obtained with a crystal structure that can be adjusted to an anatase or an anatase/rutile mixture.

These TiO_2 nanotubes combine the unique geometrical features with a range of remarkable electrical, mechanical and chemical properties used, for example, in self-cleaning applications or dye-sensitized solar cells. [3, 4]

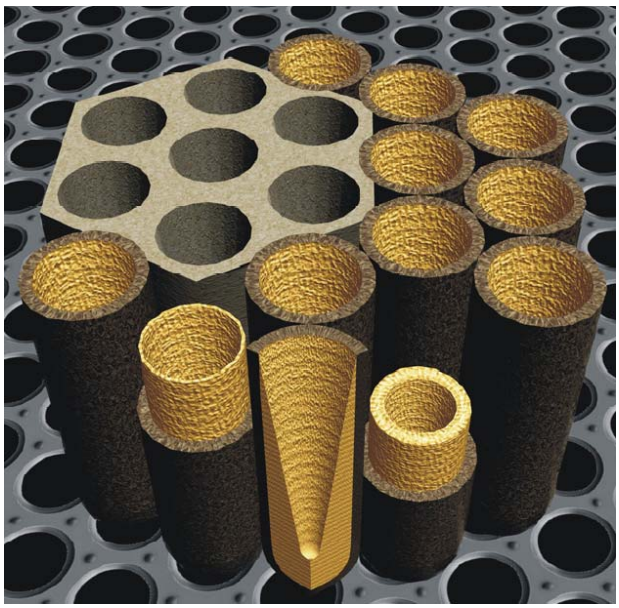

Fig. 1 Schematic illustration of the double-walled TiO_2 nanotubes.

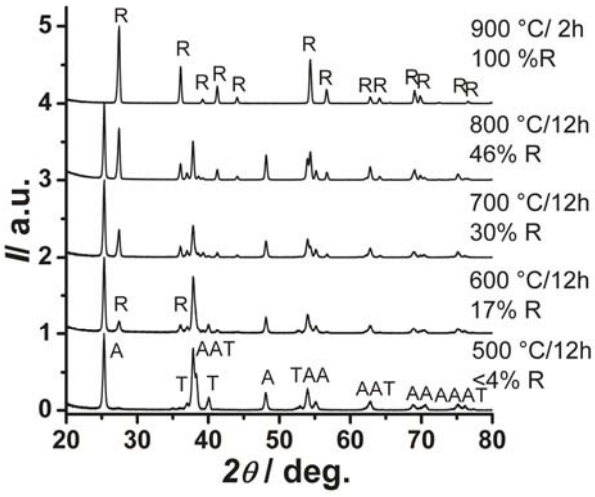

Fig. 2 XRD spectra of the double-walled TiO_2 nanotubes at different temperatures.

References:

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4. A. Ghicov, P. Schmuki, *Chem. Commun.* 2008, (submitted).