Desalination and Water Treatment
www.deswater.com

28 (2011) 23–27
April

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doi: 10/5004/dwt.2011.2195

Electrochemical synthesis of doped TNT as a nano photocatalyst for color degradation applications

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Received 1 February 2009; Accepted 1 July 2010

ABSTRACT

The preparation of high aspect-ratio TiO_2 nanotubes and their photocatalytic activity were demonstrated in this study. The high aspect-ratio TiO_2 nanotube thin films were produced by electrochemical anodic oxidation of Ti in chloride-containing electrolytes. Nanotubes were doped with different concentrations of ZnO particles through anodization. The catalytic behavior was evaluated under batch reactor with photo-degradation test of Red Dye. The experimental results collectively demonstrate the successful ZnO doping of the resultant nanotube layers with significant abundant OH groups on their increased surfaces. The nanotubes doped with high content combined with an anatase as a two phase semiconductor led to the formation of very active photocatalyst with highly surface reaction sites. In contrast, to the undoped TNT, its anatase/rutile phase ratios are increased. These effects could be attributed to the enhanced critical active-site density on the surface, which provides better photocatalytical properties.

Keywords: Photocatalyst; Titania nanotube; Microstructure; Electrochemical

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Presented at the 1st International Conference on Water and Wastewater Treatment, April 21–22, 2010, Isfahan, Iran