Synthesis of TiO(2) nanotubes and its photocatalytic activity for H(2) evolution

Author(s): Jitputti, J (Jitputti, Jaturong)[1]; Pavasupree, S (Pavasupree, Sorapong)[1,2]; Suzuki, Y (Suzuki, Yoshikazu)[1]; Yoshikawa, S(Yoshikawa, Susumu)[1]

Source: JAPANESE JOURNAL OF APPLIED PHYSICS **Volume:** 47 **Issue:** 1 **Pages:** 751-756 **DOI:** 10.1143/JJAP.47.751 **Part:** Part 2 **Published:** JAN 2008

Abstract: TiO(2)-derived nanotubes were prepared by hydrothermal treatment in 10 M NaOH(aq) by using commercially available TiO(2) (Degussa P-25) as starting material. N(2)-adsorption/desorption analysis, scanning electron microscopy (SEM), transmission electron microscopy (TEM), and X-ray diffraction (XRD) observations of the obtained product revealed the formation of titanate nanotube structure with its diameter of about 10-20nm. The effect of post-heat-treatment on the phase structure, morphology, specific surface area and photocatalytic activity was investigated. The TiO(2) (B) nanotubes could be observed at post-heat-treatment of 300 degrees C. As post-heat-treatment was increased to 400 degrees C, the nanotubes began to transform into nanoparticles of anatase phase, producing a bi-crystalline mixture of TiO(2) (B) nanotubes and anatase nanoparticles. Moreover, the particles changed into rutile phase through the post-heat-treatment at higher temperatures over 700 degrees C. The photocatalytic activity of prepared samples was evaluated with photocatalytic H(2) evolution. The results showed that the TiO(2)-derived nanotubes treated at appropriate temperature exhibited high H(2) evolution.

Addresses:

1. Kyoto Univ, Inst Adv Energy, Kyoto 6110011, Japan
2. Rajamangala Univ Technol Thanyaburi, Fac Engn, Dept Mat & Met Engn, Pathum Thani 12110, Thailand