

EUROMAT 2011 **FEMS**



Comedia SCLM Communication

European Congress
on Advanced Materials and Processes

12-15 September 2011

Montpellier, France

SF2M

Société Française
de Métallurgie et de Matériaux



Associazione Italiana
di Metallurgia

Main Topics

Functional Materials: Properties & Applications

Magnetic Materials; Materials for Nanostructures; Functional Polymeric Materials; MEMS, NEMS and Devices

Structural Materials: Properties & Applications

Advanced Metals; Advanced Ceramics; Hybrid and Composite Materials; Advanced Concepts in Structural Materials

Materials Processing

Solidification and Solid State Transformations; Joining; Powder Routes: from Synthesis to Materials; Coatings and Surface Engineering; New concepts in Materials Processing

Characterisation and Modeling

Microstructural Characterisation Techniques; Mechanical Characterisation Techniques; Materials Modeling on all Length Scales

Energy and related Applications

Energy Production, Transportation and Management; Materials for Energy in a Sustainable Society; Materials for Transportation

Health Care Applications

Materials for Health Care Applications

Education

Topic Area	C Processing	
Topic	C3 - Powder routes : from synthesis to materials	C31-P-1-41
Symposium	C31 - Powder Synthesis and Processing	1509
Session		

Synthesis of core-shell TiO₂/V₂O₅ nanowires and their photocatalytic property

W. Avansi (Unesp, São Carlos, Brazil), V. Mendonça, C. Ribeiro, E. Longo

W. Avansi (), w_avansi@yahoo.com.br

V. Mendonça ()

C. Ribeiro ()

E. Longo ()

Abstract

Over the last decades, there has been considerable interest in the synthesis of semiconductor photocatalysts for potential environmental applications which include air purification and water disinfection. Among them, due to their chemical and physical properties, V₂O₅ and TiO₂ nanostructures have been extensively studied as photocatalysts (1; 2). There are many reports showing that the photocatalytic activity can be increased effectively by combining different semiconductor nanomaterials with different band energies (3). In this sense, this study examined the potential of a combination of TiO₂ and V₂O₅ nanowires for effective photocatalytic applications. The method employed for the synthesis of vanadium pentoxide nanowires and TiO₂ nanoparticles was described in greater detail by Avansi et al (4) and Reyes-Coronado et al (5), respectively. In a typical procedure to obtain core-shell TiO₂/V₂O₅ nanowires, an appropriated amount of solution containing TiO₂ nanoparticles and V₂O₅ nanowires was prepared. Then, this mixed solution was placed in a 100 mL hydrothermal cell and subjected at different temperature and time of treatments. The precipitates were separated by centrifugation, washed with pure alcohol for several times and then dried at 50 °C for 24 h. The photocatalytic behavior of the TiO₂/V₂O₅ nanowires for the photodegradation of Rhodamine-B (RhB) under UV exposure was examined. The as-prepared samples were characterized with X-ray diffraction (XRD), Transmission Electron Microscopy (TEM) and energy dispersive x-ray analysis (EDXA). For the samples obtained through hydrothermal treatment at 200°C during 6 hours, X-ray diffraction revealed the presence of V₂O₅ nanowires in orthorhombic phase and TiO₂ nanoparticles in anatase phase. The Transmission Electron Microscopy (TEM) images confirms that the V₂O₅ nanowires are coated with TiO₂ nanoparticles with 5-8nm of diameter. The EDXA spectrum of as-obtained samples confirms only the presence of titanium (Ti), vanadium (V) and oxygen (O) without impurities in the as-prepared samples. The significant enhancement of the photocatalytic activity for the as-prepared core-shell TiO₂/V₂O₅ nanowires was observed.

1. Sun, Q. O. e Y. M. Xu. Journal of Physical Chemistry C, 114, 44, 18911-18918 (2010).
2. Li, B. X., Y. Xu, G. X. Rong, M. Jing e Y. Xie. Nanotechnology, 17, 10, 2560-2566 (2006).
3. Zou, C. W., Y. F. Rao, et al. Langmuir, 26, 14, 11615-11620 (2010).