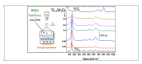
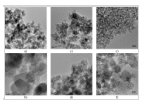




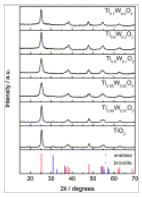
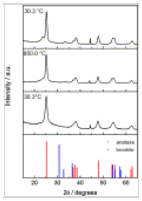
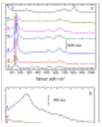


Table 1





Applied Catalysis B: Environmental

Volume 147, 5 April 2014, Pages 756–763

Mixed-oxide $Ti_{1-x}W_xO_2$ as support for (photo)-electrochemical processes

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doi:10.1016/j.apcatb.2013.10.012

Highlights

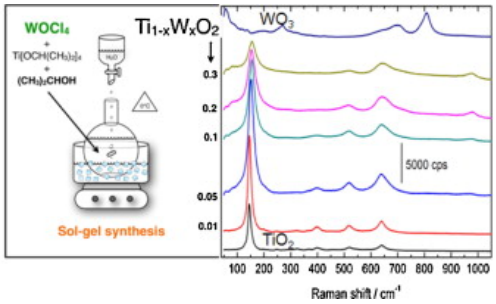
- Nanostructured mixed-oxide $Ti_{1-x}W_xO_2$ ($0 < x < 0.3$) was synthesized by sol–gel.
- W ($x \leq 0.5$) is incorporated into the anatase phase with an expansion of the lattice.
- With W content ($0.5 < x < 0.3$) compressive strains appeared with formation of wolframyl groups.
- The incorporation of W ($x < 0.3$) led to a decrease of the photoresponse and an increase of the conductivity.
- The nanostructured oxides are ceramic substrates for Pt or Ir-based electrodes of PEM fuel cells and electrolyzers.

Abstract

In this study, mixed-oxides of $Ti_{1-x}W_xO_2$ ($0 \leq x \leq 0.3$) nanomaterials have been synthesized via a multistep sol–gel process. The effect of W doping on the anatase structure and on the electrical conductivity of the material was investigated. Photo-electrochemical action spectra and UV–vis spectroscopy were used to determine the bang-gap energy of the mixed-oxides. The electrochemical stability of these materials was also investigated before they were tested as substrate for platinum nanocatalysts for oxygen reduction reaction. The metal was deposited onto the support either via the chemical route (carbonyl method) or via UV-irradiation.

Graphical abstract

A series of mixed-oxide of TiO_2 has been prepared via a multistep sol–gel chemical process. The effect of W doping on the anatase structure and on the electrical conductivity of the material was investigated.



Keywords

TiO_2; Sol–gel; Photoelectrochemistry; ORR; Substrate

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