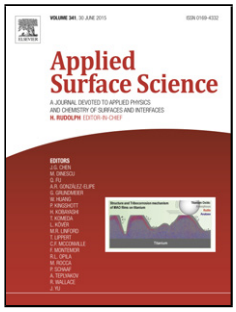

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PII: S0169-4332(16)30158-1
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2016.02.011
Reference: APSUSC 32529

To appear in: *APSUSC*

Received date: 2-11-2015
Revised date: 25-1-2016
Accepted date: 1-2-2016

Please cite this article as: G.S. Zabrodina, S.G. Makarov, K.V. Kremlev, P.A. Yunin, S.A. Gusev, B.S. Kaverin, L.B. Kaverina, S.Yu. Ketkov, Novel hybrid materials based on the vanadium oxide nanobelts, *Applied Surface Science* (2016), http://dx.doi.org/10.1016/j.apsusc.2016.02.011

Novel hybrid materials based on the vanadium oxide nanobelts

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Novel hybrid materials based on zinc phthalocyanine and nanostructured vanadium oxides have attracted extensive attention for the development of academic research and innovative industrial applications such as flexible electronics, optical sensors and heterogeneous catalysts. Vanadium oxides nanobelts were synthesized via a hydrothermal treatment $V_2O_5 \cdot nH_2O$ gel with surfactants (TBAB, CTAB) used as structure-directing agents, where CTAB – cetyltrimethylammonium bromide, TBAB – tetrabutylammonium bromide. Hybrid materials were prepared decoration of $(CTA)_{0.33}V_2O_5$ flexible nanobelts with cationic zinc phthalocyanine by the ion-exchange route. Investigations of the thermal stability, morphologies and structures of the $(CTA)_{0.33}V_2O_5$, $(TBA)_{0.16}V_2O_5$ nanobelts and zinc phthalocyanine exchange product were carried out. The hybrid materials based on the nanostructured vanadium oxide and zinc phthalocyanine were tested as photocatalysts for oxidation of citronellol and 2-mercaptoethanol by dioxygen.

Keywords: vanadium oxides; nanobelts; flexible; zinc phthalocyanine; hydrothermal synthesis; photocatalysis

1. Introduction

Design of novel unique materials combining the properties of organic and inorganic compounds provides the development of innovative industrial applications and academic research. The intercalation of organic molecules (quest) into an anisotropic inorganic network (host) is an original approach for the preparation of the hybrid composites. Metallophthalocyanines (MPcs), the analogues of naturally occurring porphyrins, are pigment dyes that contain unique л-conjugated electron system bonded to a central metal atom. They represent «sweet filling» for layered nanostructured hybrids. Owing to their increased stability, architectural flexibility, diverse coordination properties and improved spectroscopic characteristics such materials are used in mass of applications: catalysts, non-linear optical