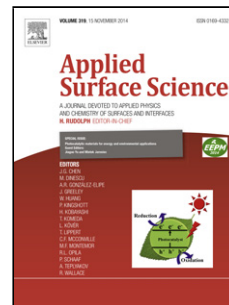


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Author: M. Scarisoreanu I. Morjan C.-T. Fleaca I.P. Morjan
A.-M. Niculescu E. Dutu A. Badoi R. Birjega C. Luculescu E.
Vasile V. Danciu G. Filoti



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Synthesis and optical properties of TiO₂-based magnetic nanocomposites

M. Scarisoreanu¹, I. Morjan¹, C.-T. Fleaca^{1,2,*}, I.P. Morjan¹, A.-M. Niculescu¹, E. Dutu¹,
A. Badoi¹, R. Birjega¹, C. Luculescu¹, E. Vasile³, V. Danciu⁴, G. Filoti⁵

¹ National Institute for Lasers, Plasma and Radiation Physics (NILPRP) , Atomistilor 409, POB MG-36, Magurele, Bucharest 077125, Romania;

² "Politehnica" University of Bucharest, Physics Department, Independentei 313, Bucharest, Romania;

³ "Politehnica" University of Bucharest, Faculty of Applied Chemistry and Materials Science, Department of Oxide Materials and Nanomaterials, Gh. Polizu 1-7, Bucharest, Romania;

⁴ National Institute for Materials Physics (NIMP), Atomistilor 105bis, P.O. Box MG7, R-077125 Magurele, Bucharest, Romania;

⁵ "Babes-Boyai" University, Faculty of Chemistry and Chemical Engineering, Electrochemical Research Laboratory, 11 Arany Janos Str, Cluj- Napoca, 400028, Romania;

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Abstract

Magnetic titania nanoparticles covered/embedded in SiO₂ shell/matrix were simultaneously manufactured by the single-step laser pyrolysis. The present study is a continuation of our previous investigations on the TiO₂/Fe and TiO₂/HMDSO (hexamethyldisiloxane) derived-systems. The aim of this work is to study the synthesis by IR (Infrared) laser pyrolysis of magnetic TiO₂ based nanocomposites which implies many concurrent processes induced in the gas phase by the laser radiation. The dependence between characteristic properties and the synthesis parameters was determined by many analytical and complementary methods: XRD (X-ray diffraction) structural analysis, UV-Vis (Ultraviolet-visible) and EDAX (Energy-dispersive X-ray) spectroscopy, TEM and HRTEM (Transmission Electron Microscopy at low and high resolution) analysis and magnetic measurements. The results of analysis indicate the presence of disordered silica, Fe, α -Fe₂O₃ and mixtures of anatase and rutile phases with mean crystallite dimensions (in the 14-34 nm range) with typical character of diluted magnetic oxide systems and a lower bandgap energy ($E_g = 1.85\text{eV}$) as compared with TiO₂ P25 Degussa sample.

PACS: 81.16.Mk, 75.50.Tt, 78.67.Bf

*Corresponding author Tel.: +4021-4574489; fax: +4021-4574243 E-mail address:
claudiufleaca@yahoo.com

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