The Serbian Ceramic Society
The Academy of Engineering Sciences of Serbia
Institute for Multidisciplinary Research - University of Belgrade
Institute of Physics - University of Belgrade
Vinča Institute of Nuclear Sciences - University of Belgrade

PROGRAMME and the BOOK of ABSTRACTS

2CSCS-2013

2nd Conference of the Serbian Ceramic Society
June 5-7.2013. Belgrade Serbia

Edited by:
Snežana Bošković
Vladimir V. Srdić
Zorica Branković

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Editors-in-Chief
Dr Snežana Bošković
Prof. Vlaimir V. Srdić
Dr. Zorica Branković

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P-11

STRUCTURAL AND MICROSTRUCTURAL CHARACTERIZATION OF BST CERAMICS OBTAINED BY HYDROTHERMALLY ASSISTED COMPLEX POLYMERIZATION METHOD

Jovana Ćirković, Tatjana Srećković, Katarina Vojisavljević, Zorica Branković, Goran Branković

Institute for multidisciplinary research, University of Belgrade, Serbia

Barium strontium titanate powder $Ba_{0.8}Sr_{0.2}TiO_3$ (BST) has been obtained by hydrothermal treatment of precursor solution containing titanium citrate, previously prepared by complex polymerization method, and barium and strontium acetates. The powders were calcined at 700°C, pressed into pellets and further sintered at 1280°C using different times (from 1 to 32 h). The phase compositions of sintered samples were followed using X-ray diffractometry and EDS analysis. Microstructural properties were investigated using scanning electron microscopy. It was found that BST sintered samples contained a two-phase structure. Sintered samples underwent an abnormal grain growth, whereby some grains grow faster than the other due to the presence of two-phase structure.

P-12

FUNCTIONALIZATION OF THE TITANATE NANOTUBES WITH A SILANE COUPLING AGENT

Patricia I. Pontón[1], Lidija Mancic[2], Slavica Savic[3], Bojan A. Marinkovic[1]

[1] *Departamento de Engenharia de Materiais, Pontifícia Universidade Católica do Rio de Janeiro, Rio de Janeiro, Brazil*
[2] *Institute of Technical Sciences of SASA, Belgrade, Serbia*
[3] *Institute for Multidisciplinary Research, University of Belgrade, Serbia*

In order to develop new nanosized filler compatible with the thermoplastic polymer Nylon-11, trititanate nanotubes (TTNTs) were synthesized by standard alkaline hydrothermal treatment of a TiO_2 anatase powder in 10 M NaOH at 120 °C for 24 h. After the synthesis, the as-obtained nanopowder was washed differently (either with water or HCl), in order to prepare TTNTs with high and low sodium contents. Chemical functionalization of TTNTs was performed with 3-aminopropyltriethoxisilane (APTES) coupling agent using two different reaction

media (water and an ethanol/water mixture) with the aim to improve the bonding between inorganic hydrophilic fillers and hydrophobic polymer matrix. Fourier transform infrared spectroscopy (FTIR), thermogravimetry analysis (TGA), transmission electron microscopy (TEM), zeta potential and CHN elemental analyses were used to elucidate the grafting mechanism of APTES at TTNTs surface. The obtained results shown that: APTES coupling agent is bounded covalently to the TTNTs surface (Ti-O-Si bond was identified after deconvolution of the IR bands at 800-1000 cm^{-1}); grafted amount of APTES is almost independent of the reaction media; protonation of $-NH_2$ groups shift the isoelectric point from pH 2.4 to pH 6.6; TTNTs kept their original size and shape after silanization.

P-13

APPLICATION OF THE LAYERED TITANATES IN WATER PURIFICATION

Ljubica M. Nikolić, Marija Milanović

University of Novi Sad, Faculty of Technology Novi Sad, Bul. cara Lazara 1, 21000 Novi Sad, Serbia

Titanate nanostructures (e.g. nanotube and nanosheets) possess a unique combination of physical and chemical properties due to their specific structure (high surface area, large ion–exchange capabilities and electroconductivity) that can provide a wide range of possible applications, such as those in photocatalysis, lithium batteries, sensor applications, hydrogen production and storage, water purification etc. As one kind of main organic pollutants in water, dyes have been widely used in industry and our daily life. The layered structure has advantages in making effective exchange with most cations in water, while the large surface area provides active surface for adsorption. In this work, layered titanates were synthesized by simple hydrothermal procedure in highly alkaline conditions, starting from commercial titania powder (Degussa P25). To examine the adsorption and the photocatalytic activity of the synthesized layered titanates, methylene blue (MB) was employed as a target compound in response to visible light at ambient temperature. The morphology and structures of as-prepared samples were investigated by transmission electron microscopy, X-ray diffraction, Raman spectroscopy and N_2 adsorption/desorption. The concentration change of MB due to adsorption and photocatalysis was monitored by visible spectrophotometer at the maximum absorption wavelength of MB (λ = 664 nm). Prepared layered titanates have high values of the specific surface areas (higher than 300 m^2/g) which make them good candidates for different types of applications, especially for water purification, since these materials showed remarkable adsorption capacity for MB removal.