The Seventh Students' Meeting

PROCESSING AND APPLICATION OF CERAMICS

PROGRAMME and BOOK OF ABSTRACTS

Students' Meeting
Novi Sad

SM-2007

Novi Sad
December 6-8, 2007

Programme and Book of Abstracts of The Seventh Students' Meeting – SM-2007, "Processing and Application of Ceramics" publishes abstracts from the field of ceramics, which are presented at traditional international Students' Meeting.

Editors-in-Chief
Prof. Dr Vladimir V. Srdić
Prof. Dr Jonjaua Ranogajec

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

For Publisher
Prof. Dr Zoltan Zavargo

Printing layout
Marija Maletin, Ivan Šefer

Production
VERZAL, Novi Sad, Serbia

CIP – Каталогизација у публикацији
Библиотека Матице српске, Нови Сад

666.3/.7(048.3)

STUDENTS' Meeting School of Ceramics (7 ; 2007 ; Novi Sad)

Programme and book of abstracts / The Seventh Students' Meeting – SM-2007 Processing and Application of Ceramics, December 6–8, 2007 ; editors Vladimir V. Srdić, Jonjaua Ranogajec. – Novi Sad : Faculty of Technology, 2007 (Novi Sad : Verzal). – XI, 86 str. : ilustr. ; 24 cm

Tiraž 120. – Bibliografija. – Registar.

ISBN 978-86-80995-62-5

a) Керамика – Технологија – Апстракти

COBISS.SR-ID 226695943

A11

THE INFLUENCE OF FORMING METHOD ON DENSIFICATION AND FINAL MICROSTRUCTURE OF SUBMICROMETRE ALUMINA

Monika Mikoczyová, Dušan Galusek

Vitrum Laugaricio, Joint Glass Center of the Institute of Inorganic Chemistry, Slovak Academy of Sciences, Alexander Dubček University of Trenčín, Trenčín, Slovak Republic

Conditions of green body preparation and consequently the conditions of sintering are prerequisite for the preparation of dense samples of Al_2O_3 with superior optical and mechanical properties. The goal of this work was determination of forming conditions for preparation of green body, and to find out optimal sintering regime facilitating the preparation of ultra-fine grained high purity alumina with maximal density, the finest microstructure and the lowest pore size.

A12

MORPHOLOGICAL FEATURES OF Y_2O_3:Eu PARTICLES OBTAINED THROUGH TWIN FLUID AND ULTRASONIC ATOMIZATION

K. Marinković[1], L.Gomez[2], M.E. Rabanal[2], L. Mančić[1], O. Milošević[1]

[1]*Inst. of Technical Sciences, Serbian Academy of Science and Arts, Belgrade, Serbia*
[2]*University Carlos III, Avda., Madrid, Spain*

Modern display devices such as plasma display and field emission display employ advanced Eu-doped yttrium oxide material, a well-known red phosphor. Utilization in such devices requires particles with spherical shape, narrow size distribution and non-aggregation characteristics since this ensures high resolution and improved brightness. Spray pyrolysis is a feasible method for obtaining the needed phosphor particle characteristics in view of the fact that atomized precursor solution, when fed into furnace, leads to the successive solvent evaporation, drying, solute precipitation and chemical decomposition on a droplet level, ensuring the formation of particles with required compositional and structural characteristics. Atomization process can be established by two different principles: disintegration of liquid jet by an air flow in case of twin-fluid atomizers and by liquid sonication. The latter phenomenon occurs when a liquid is placed on a smooth surface that is set into vibrating motion perpendicular to the surface. When the amplitude of the underlying vibration increases to the critical value the generated standing waves start to collapse and tiny drops of liquid are ejected from the top of the degenerating waves normal to the atomizing surface.

In this work yttrium oxide doped with 5 at% of europium was directly prepared by spray pyrolysis at 900°C and the effect of the type of atomization process on the

morphology and the size of the particles was investigated by using RBI's ultrasonic atomizer (frequency 1.3 MHz) and a TSI 3079 Model twin-fluid atomizer. Under the frequency of 1.3 MHz generated droplets have the mean size around 3 μm. In general it is considered that droplets produced by ultrasonic atomization have a relatively narrow size distribution and smaller particle size than twin-fluid, but depending on the specific nozzle and the type of liquid delivery system employed in twin-fluid atomization submicronic droplets can be generated as well. The twin-fluid used in this work uses a compressed air atomizer with a stainless-steel twin-stream injection nozzle producing a polydisperse aerosol with a mean droplet diameter of 0.3 μm. Since the properties of advanced materials significantly depend on particle size, shape and morphology it is of great interest to find out the correlation between those characteristics and processing parameters. Detail characterization of produced powders was carried out by means of XRD, SEM/EDS and TEM analysis.

A13

TUNABILITY IN $BaTiO_3$-BASED SOLID SOLUTIONS: MODELLING AND EXPERIMENT

Lavinia-Petronela Curecheriu

Department of Solid State and Theoretical Physics, "Al. I. Cuza" University, Iasi, Romania

The ferroelectrics show a strong nonlinearity under the electrical field. In the last few years, electric field-tunable dielectrics have attracted much interest for their potential applications as variable capacitors, phase shifters, tunable filters and voltage-controlled oscillators [1], particularly in circuits and devices needed by the wireless communications industry, for scientific, space, commercial and military use. The electric field-induced tunability describes the ability of a material to change its permittivity by the electric field.

In the present work, the dc-electric field dependence of the permittivity ε_r (E) in polar dielectrics was theoretically studied and compared with experimental data of some $BaTiO_3$-based solid solutions. The Landau-Ginzburg-Devonshire (LGD) theory and its approximate treatments (Johnson's relation) in case of a single polarization mechanism in dielectrics were firstly used [2]: ε_r (E) was calculated by using the Johnson's relation, the even-power equation, and the LGD theory (Fig. 1, a). The experimental results for $BaTiO_3$-based ceramics were fitted with these models and a good agreement was obtained, particularly at low fields. The experimental dependence in $Ba(Zr,Ti)O_3$ ceramics is well described by the Johnson eq. (Fig.1 b). By using the fitting results, the outputs of circuits containing tunable ferroelectrics can be simulated.