Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION VIII
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 23-25. September 2019.

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INV-BCS 1

Thermal thin film investigations via Time Domain Thermoreflectancemethod on Nb_2O_5

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The on-going miniaturization trend in the field of microelectronics has created new thermal challenges due to increasing processing speeds in combination with continuous size reduction and hence increasing power densities. Smaller chip-sizes increase the difficulty to mitigate heat, resulting in reliability and performance loss of devices. The operating temperature ofdevices hampers linearly their performance and increases their failure rate exponentially. Thus, it is necessary to develop heat dissipation strategies, which requires knowledge of the thermophysical properties of its constituent thin films in the nanometer regime.

The determination of these thermophysical properties can be donewith the Time Domain Thermoreflectance (TDTR). The thermal transient can be recorded in picosecond time resolution, providing the thermal diffusivity of nanometer thin filmsand the thermal interface resistances. Here, the TDTR method is presented by the example of Niobium pentoxide (Nb_2O_5) film, which can be found in optical applications, solar cells, gas sensors, and microelectronic devices.The investigations with the TDTR allow ananalysis ofthethermophysical propertiesin terms of their structure (crystalline and amorphous), thickness and temperature dependency.

INV-BCS 2

Morphological and structural characterization of spinel $MgAl_2O_4$

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Magnesium aluminate has spinel structure and very good mechanical, chemical, and thermal properties. Owing to these properties, it has a wide range of applications includingrefractory ceramics, optically transparent ceramic windows and armors. Its low dielectric permeability and low loss tangent enable itsusing for integrated electronic devices, as well. Furthermore, as a porous ceramic, magnesium aluminate has important application as humidity sensor, catalyst and filter for waste water purification.

In this paper, synthesis and characterization of $MgAl_2O_4$ was performed. Stochiometric ratio of MgO and Al_2O_3powders was mixed and calcined within the temperatures range 1500-1800 °C to produce pure spinel phase. Thereafter pellets were crushed and treated in planetary ball mill for 60 minutes to obtained fine grain. All powders, calcined and milled, were examined for phase composition, crystal structure, and morphology. The obtained results showed that by increasing the temperature denser samples but more fragile have been synthesized. Milling for 1 hour leads to crumble of bigger particles and getting finer, single phase powders. XRPD and Raman spectroscopy showed disorder in crystal structure after milling.