

Faculty of Technology
University of Novi Sad

Conference for Young Scientists in Ceramics

10th Students' Meeting
and
3rd ESR COST MP0904 Workshop

Book of Abstracts

SM 2013
COST SIMUFER

Novi Sad, Serbia, November 6-9, 2013

**CONFERENCE for YOUNG SCIENTISTS in
CERAMICS**

**The Tenth Students' Meeting, SM-2013
The Third ESR Workshop, COST MP0904**



**PROGRAMME
and
BOOK OF ABSTRACTS**

**November 6-9, 2013
Novi Sad, Serbia**

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INFLUENCE OF DOPING AGENT ON THE MULLITISATION PROCESS IN ALUMOSILICATE CERAMICS

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Keywords: mullite, kaolin, alumina, metal oxide, porosity, refractory ceramics

The ceramics for heat insulation, improvement of technological process of ceramics production, economy of energy and raw materials are actual nowadays. For example, the refractoriness of aluminosilicate ceramics at temperature above 1580 °C can be achieved when mullite ($3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$) phase is the main crystalline phase of these materials. Mullite ceramics also display definite mechanical strength and excellent resistance to chemical corrosion. Therefore the dense mullite ceramics have been widely used as constructional materials as well as the high porosity mullite ceramics serve as heat insulators and filters in the thermal protection systems and technical equipments.

Different alumina and silica raw materials can be used for such ceramic production. The process of mullitisation, its initial temperature and dominance of mullite phase depends on these raw materials and some additives such as metal oxides. Therefore the aim of this work was to investigate the influence of MgO , WO_3 and ZrO_2 on the process of mullitisation of samples. The porous mullite materials were prepared by slip casting of suspension of raw materials where the aluminium paste was used as a pore former. The raw materials were kaolin (*MEKA, Germany* with SiO_2 - 56.2 wt.%, Al_2O_3 - 31.0 wt.%), pure silica ($d_{50} = 6.94 \mu\text{m}$), different alumina (*Nabalox, Germany*, α - Al_2O_3 ($d_{50} = 4 \mu\text{m}$) and γ - Al_2O_3 ($d_{50} = 80 \mu\text{m}$)). The Al_2O_3 and SiO_2 were in 2.57:1 ratio and conformed to the mullite stoichiometric composition ($3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$). The ratio of α - and γ -alumina was 1:3. The kaolin used 30 wt.%, additives - 1, 3, 5 and 7 wt.%. Porous mullite ceramic was obtained by slip casting of suspension of raw materials and H_2 elimination by chemical reaction of Al with water. The samples were sintered at the different temperatures (1300 °C, 1500 °C, 1650 °C and 1700 °C).

The Differential thermal analysis, X-ray diffraction analysis and scanning electron microscopy were used as the main methods respectively for analysis of mullitisation beginning, phase composition and microstructure of samples.

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