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The Conference will be organized by the Latvian Materials Research Society and by Institute of General Chemical Engineering (Riga Technical University).

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Sessions

1. Advanced materials and materials engineering
    - Biomaterials engineering and applications
    - Materials for energy and environmental applications
    - Materials characterization
    - Hybrid materials
    - Functional materials
    - Structural materials

2. Powder materials and powder metallurgy
    - Powder synthesis and processing
    - Porous and cellular metallic materials

3. Coatings and surface engineering

4. Material mechanics and tribology

FRIDAY, 15th NOVEMBER 8.00-10.40

8.00 – 8.40	Registration In TALLINK Hotel		
8.40 -10.20	**Oral presentation**		
Hall 1		Hall 2	
Biomaterials engineering and applications		Powder synthesis and processing	
Prof. Remigiusz Michalczewski		*Dr.* Ina Pundiene	
8.40 *O-17* *Page 30*	Zilgma Irbe, Ilze Balode and Līga Bērziņa-Cimdiņa **Fast Setting Pre-Mixed Calcium Phosphate Bone Cements Based on α-Tricalcium Phosphate**	8.40 *O-22* *Page 35*	Kristjan Juhani, Jüri Pirso, Marek Tarraste, Mart Viljus, Sergei Letunovitš **Three-Body Abrasive Wear of Reactive Sintered WC-Co Hardmetals with Grain Growth Inhibitors**
9.00 *O-18* *Page 31*	Kristine Salma-Ancane, Liga Stipniece, Guna Krieke, Marina Sokolova and Liga Berzina-Cimdina **Effect of Mg content on thermal stability of β-tricalcium phosphate ceramics**	9.00 *O-23* *Page 36*	Kaspar Kallip, Lauri Kollo, Agus Pramono, Jaana-Kateriina Gomon and Renno Veinthal **Heat Treatment of Ultrafine Grained High-Strength Aluminium Alloy**
9.20 *O-19* *Page 32*	Dagnija Loca, Zilgma Irbe, Ivita Bistrova and Liga Berzina-Cimdina **Calcium phosphate bone cements reinforced with biodegradable polymer fibres for drug delivery**	9.20 *O-24* *Page 37*	Viktors Mironovs, Matthias Kolbe, Vjaceslavs Lapkovskis, Vjaceslavs Zemcenkovs and Irina Boiko **Application of Pulse Electromagnetic Field for Metal Coatings Manufacturing**
		Materials characterization	
9.40 *O-20* *Page 33*	Linda Vecbiskena and Roberto Chiesa **Nanostructured Calcium Phosphates for Biomedical Applications**	9.40 *O-25* *Page 38*	Ludmila Mahnicka, Ruta Svinka and Visvaldis Svinka **Influence of WO_3 Amount on the Properties of Mullite Ceramics**
10.00 *O-21* *Page 34*	Maris Rundans, Ingunda Sperberga, Gaida Sedmale and Olga Muter **Influence of Bacteria Pseudomonas Fluorescens on the Properties of Latvian Clay**	10.00 *O-26* *Page 39*	Robert Talalaev, Renno Veinthal, Priidu Peetsalu Andres Laansoo **Methodology development for creating pWPS in SME using robot welding cell**
10.20-10.40	Coffee Break 1		

O-25
Influence of WO3 Amount on the Properties of Mullite Ceramics

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INTRODUCTION

The porous mullite ceramic is a well known material for high-temperature filters, furnace insulators and catalytic converters due to its properties such as refractoriness, high mechanical strength, thermal shock resistance and chemical stability. Preparation of ceramic only from pure chemicals is expensive and not economically effective. WO_3 additive is used as doping agent for modification and decrease the sintering temperature of mullite ceramic, that produced from Al_2O_3 and SiO_2 powders [1].

EXPERIMENTAL METHODS

In the present investigation the samples were obtained from two types of alumina powders (α- and γ-Al_2O_3), SiO_2, kaolin and WO_3 additive. The Al_2O_3 and SiO_2 were in 2.57:1 ratio and conformed to the mullite stechiometric composition ($3Al_2O_3 \cdot 2SiO_2$). The ratio of α- and γ-alumina was 1:3. The kaolin used 10, 20 and 30 wt%, WO_3 additive - 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 preparation method in detail was described in the previous publication [2]. Samples were sintered at the 1400°C and 1500°C temperatures.

The microstructure and phase composition of samples were characterized by XRD (X-ray difractometer "Rigaku Ultima+") and SEM (scanning electron microscope Hitachi S-4800). Pore size distribution and porosity were done by Hg porosimetry "Quantachrome Pore Master" and hydrostatic weighting.

RESULTS AND DISCUSSION

Al_2O_3 and SiO_2 powders are used as the basic raw materials, but the kaolin is used as raw material of additional alumina and silica, as well as a binder to stabilize the suspension. The chemical purity, particle size and amount of the main starting materials and doping additives influence the sintering temperature and rate of mullite formation as well as the properties of these ceramics. The WO_3-doped samples are with the smallest shrinkage in comparison with the samples without doping additive.

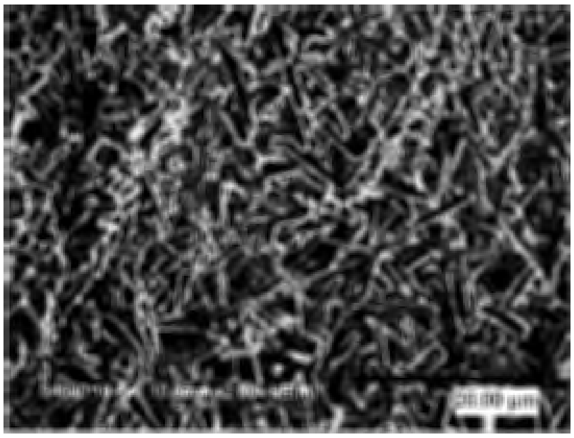

Fig. 1. SEM images of the 5 wt% WO_3-doped sample sintered at the 1500°C temperature.

WO_3 influences the samples structure. Mullite crystals in samples, that were doped 5 wt% WO_3 and sintered at the 1500°C temperature, are elongated, chaotically located and dense-packed (Fig.1). This arrangement of crystals influences reinforcement of samples, that increases the creep resistance and mechanical strength.

CONCLUSION

Usage of WO_3 additive decreases the temperature of mullite's formation, the bulk density and shrinkage, but increases porosity of samples.

REFERENCES

[1]. Kong L. *et al.*, JECS (2003), 23: 2257–2264

[2]. Mahnicka L. *et al.*, MSE (2011), 25(1): 012008