

XVI
ECerS
CONFERENCE

TORINO
16-20 JUNE
2019



**XVI CONFERENCE AND EXHIBITION
OF THE EUROPEAN CERAMIC SOCIETY**



ABSTRACT BOOK

Organized by ECerS



through ICerS



and Politecnico di Torino



**POLITECNICO
DI TORINO**

S01 - INNOVATIVE PROCESSING AND SYNTHESIS - <i>Invited Lectures</i>	5
S01 - INNOVATIVE PROCESSING AND SYNTHESIS - <i>Oral Presentations</i>	18
S02 - HT PROCESSES AND ADVANCED SINTERING - <i>Invited Lectures</i>	135
S02 - HT PROCESSES AND ADVANCED SINTERING - <i>Oral Presentations</i>	144
S03 - MODELLING OF CERAMICS - <i>Invited Lectures</i>	185
S03 - MODELLING OF CERAMICS - <i>Oral Presentations</i>	195
S04 - ADVANCED STRUCTURAL CERAMICS, COMPOSITES AND REFRACTORIES <i>Invited Lectures</i>	225
S04 - ADVANCED STRUCTURAL CERAMICS, COMPOSITES AND REFRACTORIES <i>Oral Presentations</i>	241
S05 - CERAMICS AND GLASSES FOR HEALTHCARE - <i>Invited Lectures</i>	340
S05 - CERAMICS AND GLASSES FOR HEALTHCARE - <i>Oral Presentations</i>	352
S06 - CERAMICS FOR ENERGY CONVERSION AND STORAGE - <i>Invited Lectures</i>	395
S06 - CERAMICS FOR ENERGY CONVERSION AND STORAGE - <i>Oral Presentations</i>	405
S07 - FUNCTIONAL CERAMICS - <i>Invited Lectures</i>	467
S07 - FUNCTIONAL CERAMICS - <i>Oral Presentations</i>	476
S08 - SILICATE CERAMICS - <i>Invited Lectures</i>	544
S08 - SILICATE CERAMICS - <i>Oral Presentations</i>	556
S09 - CERAMICS IN CULTURAL HERITAGE AND ART - <i>Invited Lectures</i>	616
S09 - CERAMICS IN CULTURAL HERITAGE AND ART - <i>Oral Presentations</i>	620

POSTER SESSION 1

647

POSTER SESSION 2

768

POSTER SESSION 3

886

ABS 324

THE EFFECT OF MECHANICAL ACTIVATION ON SYNTHESIS AND PROPERTIES OF MgAl₂O₄ CERAMICS

N. Obradovic ¹, W. FAHRENHOLTZ ², S. Filipovic ¹, D. Kosanovic ¹, A. Dapcevic ³, J. Rogan ³, V. Pavlovic ¹

¹ Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Belgrade, SERBIA

² Materials Science and Engineering, Missouri University of Science and Technology, Rolla, USA

³ Department of General and Inorganic Chemistry, Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, SERBIA

Magnesium aluminate, MgAl₂O₄, and other alumina-based spinels are refractory ceramics with high hardness and resistance to chemical attack while also being possible microwave dielectrics. Pure MgAl₂O₄ can be optically transparent when fully dense. Spinel exhibits inversion, which results in disorder among occupancy of A and B site cations. The goal of this study was to examine the effects of mechanical activation and composition on the temperature required for spinel formation and the site occupancy in the resulting spinel.

MgAl₂O₄ was produced by solid state reaction between MgO and alpha-Al₂O₃. The starting powders were mixed by ball milling to homogenize the powders without significant particle size reduction. Mechanical activation of mixed powders was performed in a high-energy planetary ball mill in air for 1 h. Powders were compacted at 300 MPa. Heat treatments were performed in air, at temperatures ranging from 1200 to 1500 °C with 2 h dwell time, to determine the amount of spinel formation as a function of temperature. Phase composition and microstructure of initial powders and heated samples were determined by means of X-ray diffraction, particle size analysis, and scanning electron microscopy. The influence of milling and consolidation parameters were studied by electrical measurements and mechanical characterization.

The main results of this study were that mechanical activation for 60 minutes initiated a mechano-chemical reaction, and resulted in spinel formation at much lower temperatures than within non-activated powders. Microstructures of ceramics sintered below 1400 °C indicated that final stage sintering started at much lower temperatures for activated samples than for non-activated samples.

Changes in microstructure parameters, as a consequence of mechanical treatment and subsequent heating of investigated powder mixtures, strongly affect electrical and mechanical properties of the final ceramics.

Keywords: mechanical activation, sintering, spinel



Website



Organizing Secretariat



AIM Group International
Florence Office
info@ecers2019.org

www.ecers2019.org