

FIFTEENTH ANNUAL CONFERENCE

YUCOMAT 2013

Hunguest Hotel Sun Resort Herceg Novi, Montenegro,
September 2-6, 2013
<http://www.mrs-serbia.org.rs>

Programme and The Book of Abstracts

Organised by:
Materials Research Society of Serbia

under the auspices of
**Federation of European Material Societies
and
Materials Research Society**

Title: THE FIFTEENTH ANNUAL CONFERENCE
YUCOMAT 2013
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Publisher: Materials Research Society of Serbia
Knez Mihailova 35/IV, 11000 Belgrade, Serbia
Phone: +381 11 2185-437; Fax: + 381 11 2185-263
<http://www.mrs-serbia.org.rs>

Editors: Prof. Dr. Dragan P. Uskoković and Prof. Dr. Velimir Radmilović

Technical editor: Aleksandra Stojičić

Cover page: Aleksandra Stojičić and Milica Ševkušić

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Acknowledgments:



Printed in: Biro Konto
Sutorina bb, Igalo – Herceg Novi, Montenegro
Phones: +382-31-670123, 670025, E-mail: bkonto@t-com.me
Circulation: 220 copies. The end of printing: August 2013

O.S.E.10.

GEOPOLYMER MATERIALS BASED ON THE ELECTRIC ARC FURNACE SLAG

I. Nikolić¹, I. Janković-Častvan², V.V. Radmilović², Lj. Karanović³,
S. Marković⁴, S. Mentus⁵, V.R. Radmilović²

¹*University of Montenegro, Faculty of Metallurgy and Technology, Podgorica, Montenegro,*

²*University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, Serbia,* ³*University of Belgrade, Faculty of Mining and Geology, Laboratory of Crystallography, Belgrade, Serbia,*

⁴*Institute of Technical Sciences of SASA, Belgrade, Serbia,* ⁵*University of Belgrade, Faculty of Physical Chemistry, Belgrade, Serbia*

The remelting of iron and steel scrap in the electric arc furnaces generates the non-hazardous waste – electric arc furnace slag (EAFS), which can be disposed of to appropriate landfills. Currently, this slag found its application in conventional concrete production to improve its mechanical, chemical and physical properties, as an additive to asphalt base mixture and in cement production. In this study we have investigated the effect of alkaline dosage on the strength and thermal resistance of EAFS based geopolymers. The results have shown that these materials are mainly amorphous with some crystal phases remained from the undissolved EAFS such as larnite, gehlenite, wuestite, monticellite, calcite.

Compressive strength of these materials is strongly influenced by the alkaline dosage. An increase of NaOH concentration in the interval of 7-10 M leads to the increase of geopolymer's strength. The maximal compressive strength of EAFS based geopolymer was obtained using the 10 M NaOH. Further increase of alkaline dosage to the value of 13 M NaOH results in the slight decrease of the geopolymer strength. Additionally, depending on the synthesis parameters, EAFS based geopolymers exhibit improved durability in high temperature environments in comparison with conventional cement based materials. All investigated samples exhibit a shrinkage which is attributed to the change of porosity. The mass loss due to the loss of water was also observed.

This research was supported by a Ministry of Science of Montenegro under the contract No 01-460.