Association of Metallurgical Engineers of Serbia
Faculty of Technology and Metallurgy, University of Belgrade
Institute for Technology of Nuclear and Other Mineral Raw Materials
Institute of Chemistry, Technology and Metallurgy
Vinca Institute of Nuclear Sciences
Serbian Foundrymen's Society

# MME SEE 2019

## Metallurgical & Materials Engineering Congress of South-East Europe

# BOOK OF ABSTRACTS

June, 5th - 7th 2019, Belgrade, Serbia
*www.mme-see.org*

**Association of Metallurgical Engineers of Serbia**
**Faculty of Technology and Metallurgy, University of Belgrade**
**Institute for Technology of Nuclear and Other Mineral Raw Materials**
**Institute of Chemistry, Technology and Metallurgy**
**Vinca Institute of Nuclear Sciences**
**Serbian Foundrymen's Society**

# MME SEE 2019

## Metallurgical & Materials Engineering Congress of South-East Europe

# BOOK OF ABSTRACTS

Editors:

Dragomir Glišić
Branislav Marković
Vaso Manojlović

June 5 - 7, 2019
Belgrade, Serbia

**Editors:**

**Dragomir Glišić**
Faculty of Technology and Metallurgy, University of Belgrade

**Branislav Marković**
Institute for Technology of Nuclear and Other Mineral Raw Materials

**Vaso Manojlović**
Faculty of Technology and Metallurgy, University of Belgrade

**Technical editor:**

Department of Printing Engineering
Faculty of Technology and Metallurgy, University of Belgrade

**Published by:**

Association of Metallurgical Engineers of Serbia (AMES)

**Circulation:**

120 copies

**Printed by:**

Department of Printing Engineering, Faculty of Technology and Metallurgy
Karnegijeva 4, POB 35-03
11 120 Belgrade, Serbia
Tel: +381 11 3370 492

ISBN 978-86-87183-30-8

**Scientific Committee**

- *Željko Kamberović, Serbia, president*
- *Karlo Raić, Serbia, vice president*
- *Miroslav Sokić, Serbia, vice president*
- Bernd Friedrich, Germany
- Boštjan Markoli, Slovenia
- Branislav Marković, Serbia
- Dimitrios Panias, Greece
- Veljko Đokić, Serbia
- Endre Romhanji, Serbia
- Jarmila Trpčevska, Slovakia
- Jasna Stajić-Trošić, Serbia
- Kemal Delijić, Montenegro
- Marija Korać, Serbia
- Martin Debelak, Slovenia
- Milan T. Jovanović, Serbia
- Mile Đurđević, Austria
- Miljana Popović, Serbia
- Mirjam Jan Blažić, Slovenija
- Nada Štrbac, Serbia
- Natalija Dolić, Croatia
- Nenad Radović, Serbia
- Petar Uskoković, Serbia
- Rebeka Rudolf, Slovenia
- Rossitza Paunova, Bulgaria
- Sanja Martinović, Serbia
- Srđan Marković, Serbia
- Srećko Manasijević, Serbia
- Sveto Cvetkovski, Macedonia
- Tatjana Volkov-Husović, Serbia
- Vesna Maksimović, Serbia
- Vladan Ćosović, Serbia
- Zdenka Zovko-Brodarac, Croatia
- Zijah Burzić, Serbia

**Organizing Committee**

- Dragomir Glišić
- Aleksandra Patarić
- Nataša Grujić
- Stefan Dikić
- Vaso Manojlović

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

669(048)
66.017/.018(048)
621.7/.9(048)
METALLURGICAL & Materials Engineering Congress of South-East Europe (2019; Beograd)
Book of Abstracts / Metallurgical & Materials Engineering Congress of South-East Europe (MME SEE 2019), June 5-7, 2019, Belgrade, Serbia ;[organized by] Associa-
tion of Matallurgcal Engineers of Serbia [AMES] ...[et al.] ; editors Dragomir Glišić, Branislav Marković, Vaso Manojlović. Belgrade : Association of Metallurgical Engineers of Serbia (AMES), 2019 (Belgrade : Department of Printing Engineering Faculty of Techology and Matallurgy). - 84 str. : ilustr. ; 25 cm
Tiraž 120. - Registar.
ISBN 978-86-87183-30-8

1. Association of Metallurgical Engineers of Serbia (Beograd)

a) Металургија - Апстракти
b) Технички материјали - Апстракти
c) Наука о материјалима - Апстракти
d) Металопрерађивачка индустрија - Апстракти

COBISS.SR-ID 276890124

*Publisher:*
Association of Metallurgical Engineers of Serbia
Kneza Miloša 9/IV, Belgrade, Serbia
www.metalurgija.org.rs

# CATIONIC SURFACTANTS MODIFED KAOLIN – EFFICIENT ADSORBENTS FOR MYCOTOXINS

Aleksandra Daković and Milica Spasojević

*e-mail: a.dakovic@itnms.ac.rs*

*Institute for Technology of Nuclear and Other Mineral Raw Materials, Franche d' Epere 86, 11000 Belgrade, Serbia*

The natural kaolin from a plant for the production of quartz sand in Rgotina, Serbia (KR) was modified with two cationic surfactants - octadecyl dimethyl benzyl ammonium chloride (O) and hexadecyltrimethylammonium bromide (H). Both surfactants were added in amounts equal to 90% of kaolin cation exchange capacity (CEC). The obtained materials were denoted as OKR and HKR. Characterizations of KR, OKR, and HKR were done by Fourier transform infrared spectroscopy (FTIR) spectroscopy and zeta potential measurements. FTIR spectra and zeta potential measurements confirmed the presence of both surfactants at the kaolin surface.

Adsorption of mycotoxins – zearalenone (ZEN) and ochratoxin A (OCHRA) was studied by the natural kaolin and organokaolines under *in vitro* conditions. The effects of the amount of the adsorbent, the initial ZEN and OCHRA concentrations, and pH, on adsorption of mycotoxins, were investigated. Preliminary results of adsorption of ZEN and OCHRA by KR showed that natural kaolin had no affinity to adsorb these mycotoxins. However, the presence of both organic cations in the kaolin structure significantly increased adsorption of ZEN and OCHRA. Adsorption of the mycotoxins by OKR and HKR increased with increasing the amount of each adsorbent in suspension. Slightly higher adsorption of ZEN than OCHRA by both adsorbents was observed at both pHs.

ZEN and OCHRA adsorption increased for both OKR and HKR as the concentration of the initial toxins increased at pH 3 and 7. OCHRA and ZEN are hydrophobic molecules that possess different functional groups and may exist in various forms at different pH values. OCHRA adsorption by OKR and HKR followed nonlinear isotherms at pH 3 and 7, and higher adsorption capacity was obtained for OKR. Also, OCHRA adsorption capacity for OKR and HKR was much higher at pH 3. The obtained results suggest that adsorption of OCHRA was dependent on the form of OCHRA in solution and that type of surfactant had an influence on OCHRA adsorption. Adsorption of ZEN by organokaolines also showed nonlinear isotherms at pH 3 and 7 and similar amounts were adsorbed at both adsorbents at both pH values. The obtained adsorption capacities suggest that adsorption of ZEN was practically independent of the form of the toxin in solution and also on the type of the organic cations in the kaolin structure. Based on the obtained results, kaolin modified with surfactants may be effective materials for adsorption of ZEN and OCHRA.

**Keywords:** kaolin, surfactants, mycotoxins, adsorption.