



# MME SEE

CONGRESS 2023

5<sup>th</sup> Metallurgical & Materials Engineering  
Congress of South-East Europe  
Trebinje, Bosnia and Herzegovina  
7-10<sup>th</sup> June 2023

BOOK OF  
ABSTRACTS

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## **Main Organizer**

The Association of Metallurgical Engineers of Serbia

## **Co-organizers**

Institute for Technology of Nuclear and Other Mineral Raw Materials in Belgrade, Serbia;  
The Faculty of Technology and Metallurgy at the University of Belgrade, Serbia;  
The Faculty of Technology at the University of Banja Luka, Bosnia and Herzegovina;  
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The Faculty of metallurgy and technology at the University of Podgorica, Montenegro.

## **BOOK OF ABSTRACTS - MME SEE 2023**

### **5<sup>th</sup> Metallurgical & Materials Engineering Congress of South-East Europe**

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#### **Published and printed by:**

Association of Metallurgical Engineers of Serbia (AMES)

Kneza Miloša 9/IV,

11000 Belgrade

Serbia

#### **For the publisher:**

AMES president Dr. Miroslav Sokić

#### **Circulation:**

120 copies

ISBN 978-86-87183-33-9

## PRELIMINARY CYTOTOXICITY TESTING OF NEWLY SYNTHESISED SBA-15 MATERIAL

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Material SBA-15 with all of its particles in the form of regular spheres was synthesised by template method using Pluronic P<sub>123</sub> (non-ionic triblock copolymer) as a surfactant and tetraethoxysilane (TEOS, 98%) as a source of silica. The synthesis of spherical SBA-15 was carried out in acidic conditions according to method proposed by Zhao et al. Instead of expensive commercial cetyltrimethylammonium bromide as a co-surfactant, a spent HCl solution obtained after the chemical treatment of clay in an aqueous solution of HCl was used. The mixture was aged at a higher temperature. After that, the spherical SBA-15 was made by drying at room temperature after washing with distilled water and then calcining in flowing air to decompose the triblock copolymer. The continual presence of spheres of diameters around 2 µm in the entire SBA-15 was confirmed by scanning electron microscopy. The Energy-dispersive X-ray spectroscopy confirmed that the spheres consisted only of SiO<sub>2</sub> in composition. In addition, X-ray diffraction and Fourier-transform infrared spectroscopy methods were used to characterise SBA-15 material. To assess the cytotoxic effects of newly synthesised SBA-15 material, HEK 293 cells were treated with particles and extracts obtained from particles incubated 24 hours at 37 °C in serum-free DMEM medium and DMEM with 10% serum. Cells were treated with concentrations of 100, 250, and 500 µg/mL for 72 hours. All treatments reduced cell viability in a concentration-dependent manner (p<0.001). Cytotoxicity was more pronounced in particle treatment, indicating that mechanical damage was induced in cells, whereas the extraction process influences the level of toxicity since the sera-free medium had the mildest effect. To acquire safe particles for human use, additional synthesis optimisation is required.

**Keywords:** Spherical SBA-15, Pluronic P<sub>123</sub>, Cytotoxicity