

# BOOK of ABSTRACTS

## 26<sup>th</sup> Congress of Chemists and Technologists of Macedonia

26<sup>th</sup> Конгрес на  
Хемичари и  
Технолози  
на Македонија

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**Сојуз на хемичарите и технолозите на Македонија**  
**Society of Chemists and Technologists of Macedonia**

**26<sup>th</sup> Congress of  
SCTM  
with International Participation**

**BOOK of ABSTRACTS**

**20–23 September 2023  
Metropol Lake Resort  
Ohrid, N. Macedonia**



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**Society of Chemists and Technologists of Macedonia**

20–23 September 2023, Metropol Lake Resort, Ohrid

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**РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА  
МИНИСТЕРСТВО ЗА ОБРАЗОВАНИЕ И НАУКА**

**Ss. Cyril and Methodius University in Skopje**



The 26<sup>th</sup> Congress of SCTM is a

 **EuChemS**  
European Chemical Society

recognized event.

Dear Esteemed Colleagues and Participants,

It is with great pleasure that we present the Book of Abstracts for the 26<sup>th</sup> Congress of the Society Chemists and Technologists of Macedonia, which was originally scheduled for 2020 but, due to the global pandemic caused by Covid-19, has been rescheduled to this momentous occasion. As we gather here in the breathtaking backdrop of the historic city of Ohrid, Macedonia, we reflect not only on the innovative strides made in the field of chemistry and chemical engineering, but also on the unwavering spirit of resilience that has brought us together despite the challenges that have beset us. The world has experienced an unprecedented disruption, testing the limits of our adaptability and resolve. Yet, as chemists and chemical engineers, we have shown that the pursuit of knowledge and advancement knows no bounds. Our ability to transcend obstacles, adapt methodologies, and harness innovation in the face of adversity is a testament to the invincible human spirit.

Within the pages of this Book of Abstracts with 15 invited lecturers and almost 200 presentations from 174 authors and 570 coauthors from the region and much wider making it a really international meeting, you will find a diverse array of topics that reflect the vigor and dedication of the scientific community. From breakthroughs in green chemistry to pioneering developments in materials science, from the forefront of pharmaceutical research to cutting-edge advancements in nanotechnology, each abstract showcases the remarkable flexibility and ingenuity of our colleagues.

We extend our deepest gratitude to Prof. Jadranka Blaževska Gilev and Prof. Biljana Angjuševa, the organizers of this meeting who have dedicated all their efforts and time to make this meeting possible. Our gratitude goes to all members of the scientific and organizational committees who have been in the background making sure things flow seamlessly, especially to Assoc. Prof. Vojo Jovanov, Iva Dimitrievska and Marija Prosheva for managing the web page, Book of Abstracts etc. Also, our appreciation goes to the reviewers and all participants who have come together to give the substance to this Congress. Your commitment to the scientific endeavor underscores the importance of collaborative efforts in times of uncertainty. It is through the exchange of ideas, the sharing of knowledge, and the fostering of connections that we fortify ourselves and drive the progress of our disciplines. Furthermore, our deepest gratitude goes to the sponsors given at the end of the book and most of all to the Organization for the

Prohibition of Chemical Weapons who have always given their support to our meetings.

As we come together in Ohrid, we do so with renewed appreciation for the importance of shared experiences and face-to-face interactions. We eagerly anticipate the discussions, debates, and collaborations that will shape the future of our disciplines. Let us seize this opportunity to learn, inspire, and foster connections that will resonate long after the congress concludes.

We hope that this Book of Abstracts serves as a source of inspiration and a record of the remarkable work presented at the 26<sup>th</sup> Congress of SCTM. Let us seize this opportunity to celebrate not only our achievements, but also our resilience, determination, and enduring commitment to the pursuit of knowledge. Let us navigate the challenges together, and through our collective efforts, continue to inspire innovation that transforms the world in a positive way.

With warm regards,

Prof. Zoran Zdravkovski, president

Society of Chemists and Technologists of Macedonia



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## ICTM P-5

### Preparation and Performance of Low Content Carbon Geopolymer

J. Gulicovski,<sup>a\*</sup> M. Nenadović,<sup>b</sup> M. Mirković,<sup>a</sup> Lj. Kljajević,<sup>a</sup> I. Bošković,<sup>c</sup> M. Vukčević<sup>c</sup>  
and S. Nenadović<sup>a</sup>

<sup>a</sup>*Department of Materials Science, „VINČA” Institute of Nuclear Sciences -National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia*

<sup>b</sup>*Department of Atomic Physics, „VINČA” Institute of Nuclear Sciences -National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia*

<sup>c</sup>*Faculty of Metallurgy and Technology, University of Montenegro, Cetinjski put bb, 81000 Podgorica, Montenegro*

\* [rocenj@vinca.rs](mailto:rocenj@vinca.rs)

Due to the low CO<sub>2</sub> emission of geopolymers compared to Portland cement, interest in their use as binding cement has increased in recent years. The main goal of this research is to relate the green and sustainable characteristics to the good mechanical and chemical properties of fly ash-based geopolymers. For those purposes, samples of different ratios of fly ash (FA) and metakaolin (MK) were prepared. Mineralogical characterization of the geopolymer samples conducted using X-ray powder diffraction (XRD) showed that in the geopolymer synthesis reaction new amorphous phase was formed. Diffuse reflectance infrared Fourier transform spectroscopy (DRIFT) confirmed characteristic bands of Si-O and O-Si-O groups at 1045 cm<sup>-1</sup>. Compressive strength analysis revealed that the optimal ratio of FA and MK is 50:50 and exhibits the highest value, while  $\gamma$ -ray photoelectron spectroscopy (XPS) analysis revealed the total reduction of carbon content in the alkali activated geopolymer with optimal stoichiometry 50:50. The results of this research indicates the possibility to obtain a geopolymer material with almost complete absence of carbon, which implies further application as a material with very high environmental potential and zero carbon emission.

**Keywords:** carbon reduction; compressive strength; geopolymer; metakaolin; fly ash.