



25th INTERNATIONAL MULTIDISCIPLINARY SCIENTIFIC GEOCONFERENCE - SGEM 2025

29 June – 06 July 2025 - Albena, Bulgaria

**CONFERENCE PROCEEDINGS OF SELECTED PAPERS in
NANO, BIO, GREEN, AND SPACE TECHNOLOGIES FOR
A SUSTAINABLE FUTURE**

ISSUE 6.1 / VOL 25

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Haidingergasse 1, C / 1113, Vienna 1030, Austria
Published by STEF92 Technology
Total print: 5000

E-mail: sgem@sgem.org | URL: www.sgem.org

ISBN 978-619-7603-87-3 (hard copy)

ISBN 978-619-7603-88-0 (DVD)

ISSN 1314-2704

DOI: 10.5593/sgem2025/6.1

FOREWORD

It is our honor to present the 25th edition of the *SGEM GeoConference Proceedings 2025*. These peer-reviewed proceedings reflect the scientific work presented at the SGEM GeoConference - an international platform where **Geosciences and STEM** unite to create knowledge that supports a more sustainable and responsible future. SGEM stands on a foundational belief: science is valuable not because it is new, but because it is **true, useful, and serving society**.

This volume 25 / issue 6.1: *Nano, Bio, Green, and Space Technologies for a Sustainable Future* - includes research studies on nano-materials for sustainability, biotechnology and bioengineering for eco-innovation, sustainable construction and eco-materials, climate-responsive architecture, nature-based solutions for cities, renewable energy infrastructure for green mobility, and applications of advanced space and planetary exploration technologies. These thematic areas directly support the United Nations Sustainable Development Goals: SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land).

This book highlights how innovation at the micro and nano scale can transform entire industries: from **eco-concrete reinforced with recycled aggregates and nano-enhanced materials, to biopolymers, enzyme-based processes, and natural antioxidants**. Sustainable building materials and green architecture demonstrate that construction can reduce carbon emissions while preserving heritage. Studies on **blue-green urban infrastructure, runoff management, nature-based climate solutions, and embodied carbon assessment using BIM** show how cities can evolve toward climate neutrality. At the frontier of science, space technologies examine the geomagnetic field, reflector geometry, and new frontiers such as planetary exploration and space mining, revealing how **geosciences extend beyond Earth**.

All manuscripts included in these proceedings underwent a rigorous **double-blind peer-review** process conducted by independent experts. Only papers demonstrating

scientific integrity, originality, and meaningful contribution were accepted for publication. Every accepted manuscript receives an individual **Crossref DOI** and is permanently archived in the SGEM Digital Library, ensuring academic traceability, citability, and long-term preservation.

Demonstrating geographical and disciplinary diversity, the SGEM GeoConference unites researchers, professionals, and emerging scholars from **over 25 countries across multiple continents, including developed and developing nations and diverse research traditions**. What makes SGEM unique is its profound commitment to its core mission - **promoting Sustainability, fostering progress in Geosciences and Education, and supporting continuous scientific development**. Here, the Earth is not only studied - **it is respected**.

On behalf of the Editorial Board and the SGEM Scientific Committee, we express our sincere gratitude to all authors for their trust, to the reviewers for safeguarding scientific quality, and to all institutions supporting this global scientific initiative. Together, we transform knowledge into impact and ideas into progress.

We wish you inspiring reading and meaningful scientific achievements.

Sincerely yours,

Prof. Dr. hab. oec. Baiba Rivza

Editor-in-Chief of XXV SGEM GeoConference Proceedings
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President of the Latvian Academy of Agricultural and Forestry Sciences
Vice-chair of the Latvian Council of Higher education
President of Latvian universities professors' association
Expert from the European Academy of Sciences Academic Advisory Board (EASAC)

Prof. Dr. hab. Ildiko Tulbure

Editor-in-Chief of XXV SGEM GeoConference Proceedings
Professor, Clausthal University of Technology, Clausthal-Zellerfeld, GERMANY
Professor, 1 Decembrie 1918 University, Alba Iulia, Romania
Supervisor at Technical University of Cluj-Napoca, Romania
Member of the Alexander von Humboldt Scientific Foundation, Germany
Member of the National Society for Environmental Studies & Engineering, Romania
Member of the Romanian Environmental Association, Romania

Prof. DSc. Oleksandr Trofymchuk

Editor-in-Chief of XXV SGEM GeoConference Proceedings
National Academy of Sciences of Ukraine, UKRAINE
Director of Institute of Telecommunications & Global Information Space, Ukraine
Member of the Bureau of the Informatics Department of NAS of Ukraine

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