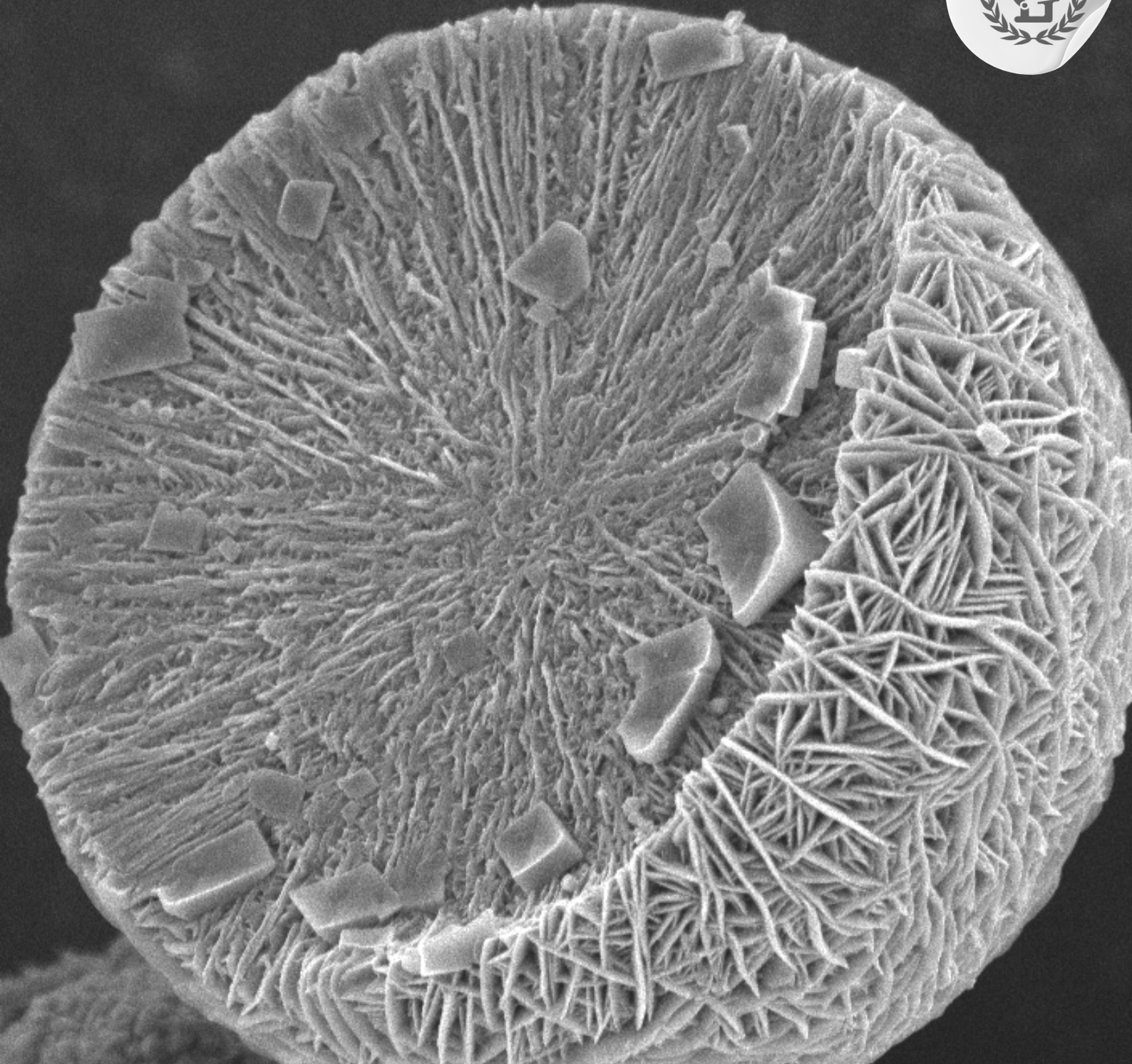




RESEARCH NEWSLETTER



**NU Schools
& Centers
News**

**Research
Support Hub
by NU Library**

**Behind
the Research**
Science stories

**Funding
opportunities**
Internal & External

Cover Image: Highly porous microparticle captured by the Electron Microscope Lab at Core Facilities and HPC.
Instrument: Carl Zeiss CrossBeam 540 Scanning Electron Microscope
Magnification: 10,000× | **Acceleration Voltage:** 5 kV

Dear NU Community,
It is our great pleasure to welcome you to the latest issue of Nazarbayev University Research Newsletter.

In this edition, we celebrate the remarkable achievements of our research community, from groundbreaking discoveries and impactful collaborations to innovations that address some of today's most pressing challenges. These pages highlight not only the outcomes of rigorous scientific work but also the passion, creativity, and dedication that drive our scholars forward.

As we look ahead, our mission remains clear: to foster an environment where ideas can flourish, disciplines can intersect, and solutions can emerge for the benefit of Kazakhstan and the global community.

IN THIS ISSUE

NU Rises by 100 Positions in Times Higher Education World University Rankings.....3

More NU Professors Join the World's Top 2% of Researchers.....4

NU Research Performance Overview.....5

NU EXPERTS IN INTERNATIONAL MEDIA

- Navigating the PhD Journey: Practical Insights for Doctoral Success.....6
- Nazarbayev University Experts Share Insights on Winning Government Research Funding in THE..7

INTERNATIONAL COLLABORATION

- UNDP Delegation Explores Research Collaboration with Nazarbayev University.....8
- NU and DFG Open New Chapter in German–Kazakh Scientific Collaboration.....9

SPOTLIGHT ON SUCCESS

- Zhanat Kappassov.....10
- Nurxat Nuraje.....12

RESEARCH SNAPSHOTS

- Shedding Light on the Shadows: Understanding Private Tutoring in Rural Kazakhstan.....14
- Rethinking the Computer Mouse: NU Research Calls for Ergonomic Revolution.....15
- Contribution to a Nature publication on Global Mycorrhizal Fungi.....16
- Machine Learning Prediction of CO2 Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions.....17
- Negative nominal rates.....18
- Global South mobility to Central Asia: why Indian medical students choose Kazakhstan and how that shapes language use.....19
- Mathematics and Chemical Engineering NU Students prevent formation of dead zones..20
- From Carbon Sequestration to Hydrogen Storage: Advancing Energy Solutions with AI..22

BEHIND THE RESEARCH

- From Robotics to AI Platforms: CEMRR's Frontier Research in Rehabilitation, Oncology, and Orthopedics.....23
- Negative Rates and Optimal Inflation: A Conversation with Julio Dávila on Modern Monetary Theory.....26
- Toward Next-Generation Functional Materials.28
- How Mehdi Bagheri's Team is Shaping the Future of Urban Health and Energy.....34

LIBRARY TOOLS FOR RESEARCHERS

- Research Support Hub by NU Library.....36

EVENTS & CONFERENCES

- ISSAI Highlights: A Roundup of Key Developments.....38
- NU Library Highlights.....40
- Participation of Nazarbayev University Researchers in QazaqGaz Scientific & Technological Session.....43
- Nazarbayev University and Purdue University hold round table to advance collaboration in AI, energy, and sensor technologies.....44
- Celebrating 15 Years of Innovation at the Center for Life Sciences: From Discovery to the Bedside.....46
- NU Annual Research Conference 2025 Empowering Innovation: Nurturing Kazakhstan's Next-Gen Researchers.....48
- Three Minute Thesis (3MT®) Competition..50
- Sustainable Development Solutions Network Highlights.....52
- CARCEIT News.....54

RESEARCH FUNDING OPPORTUNITIES

- Announcement: Upcoming Calls for Research Proposals (2026–2028).....59
- List of external research funding opportunities 60

New Research Publications Indexed by Scopus July–September 2025.....62

NU Rises by 100 Positions in Times Higher Education World University Rankings



Times Higher Education

#401-500

in the world's most prestigious

2026 Times Higher Education World University Rankings

#1

in the Caucasus & Central Asia

#4

among CIS countries

Nazarbayev University has strengthened its position on the global stage, advancing into the top 23% of universities worldwide in the Times Higher Education (THE) World University Rankings 2026.

NU first debuted in the THE World University Rankings 2024, entering the 501–600 band, which placed it among the top 30% of global universities. This year NU has advanced into the 401–500 band, confirming its status as the **#1 university in Central Asia and the Caucasus** and among the leading institutions in the Commonwealth of Independent States (CIS).

The rise reflects improvements across multiple performance indicators, with NU particularly **excelling in research quality (76.8)**, underscoring the global impact of its faculty and students. A total of 2,191 organizations from 115 countries and territories participated in the ranking.



Prof. Waqar Ahmad, President of Nazarbayev University: “Our progress in the rankings brings great credit to the NU community. It reflects the hard work and dedication of our faculty, students, and staff, and reinforces our growing reputation on the global stage. We celebrate this achievement, but also recognize areas for further improvement. Our goal is to ensure NU receives the recognition it deserves as a world-class and proudly Kazakhstani university. As we celebrate this milestone, we look ahead with renewed ambition to advancing research, fostering innovation, and expanding our impact on the world stage.”



Times Higher Education
World University Rankings 2026
World and Central Asia

Universities	2026	2025
Georgetown University	201–250	201–250
The University of Sussex	201–250	201–250
Colorado School of Mines	401–500	401–500
George Mason University	401–500	401–500
Nazarbayev University	401–500	501–600
University of Texas at Dallas	401–500	401–500
Tashkent Institute of Irrigation and Agricultural Mechanisation	501–600	601–800
Coventry University	601–800	601–800

The THE World University Rankings is regarded as one of the most prestigious global benchmarks for research-intensive universities, making NU's achievement especially noteworthy. The University's improved standing reflects gains across all three core components of the ranking - teaching, research environment, and, most notably, research quality. These areas will be core to NU's new institutional strategy, further reinforcing its growing reputation on the global stage.

More NU Professors Join the World's Top 2% of Researchers

This year, 42 NU researchers have been included in the global ranking of the world's top 2% most cited scientists, marking a 10% increase compared to last year.

The ranking, based on Scopus bibliometric data covering over 180,000 leading researchers worldwide, is compiled by a Stanford University team led by Professor John Ioannidis. It analyzes performance across 22 scientific fields and 174 subfields, following the Science-Metrix classification system. Key metrics include total citations, the h-index, the hm-index (which adjusts for co-authorship), and a composite c-score reflecting overall impact. Over the past five years, the number of Kazakhstani scientists included in this ranking has grown significantly, and more than half of them continue to represent Nazarbayev University's faculty.

The study provides two datasets: one reflecting researchers' career-long impact (up to the end of 2024) and another showing citation data for 2024 only, highlighting annual research influence.

Also, the total number of publications by NU scholars has now exceeded 10,640, accounting for roughly one-sixth of all scientific papers produced by Kazakhstani universities and research institutes.



Ata Akcil



Daniele Malafarina



Ferhat Karaca



Joseph Uy AImazan



Abduzhappar Gaipov



Vesselin Paunov



Srinivasa Rao Bolla



Dimitrios Zorbas



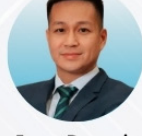
Michael Good



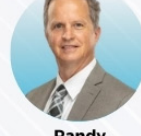
Eugene Ponomarev



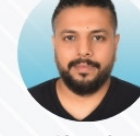
Prim Singh



Jonas Preposi Cruz



Randy Hazlett



Ahmed Elkamhawy



Kyunghwan Oh



Massimo Pignatelli



Shazim Ali Memon



Daniele Tosi



Mehdi Bagheri



Masoud Riazi



Ruslan Kalendar



Timur Atabaev



Antonio Sarria-Santamera



Huseyin Atakan Varol



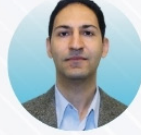
Anton Desyatnikov



Saffet Yagiz



Woojin Lee



Behrouz Maham



Sherif Araby Gouda



Muhammad Tahir Akhtar



Nickolai Barlev



Zhumabay Bakenov



Jozef Konings



Alex Ruderman



Kumar Nunna



Anas Hajar



Ton Duc Do



Mohamad Aljofan



Irshad Kammakam



Daniel Hernández-Torrano



Yuliya Semenova



Jean-Jacques Zondy

In Memoriam

NU Research Performance Overview



RESEARCH PERFORMANCE OVERVIEW
In this issue, we are delighted to present to you an overview of research activities conducted under the auspices of NU.

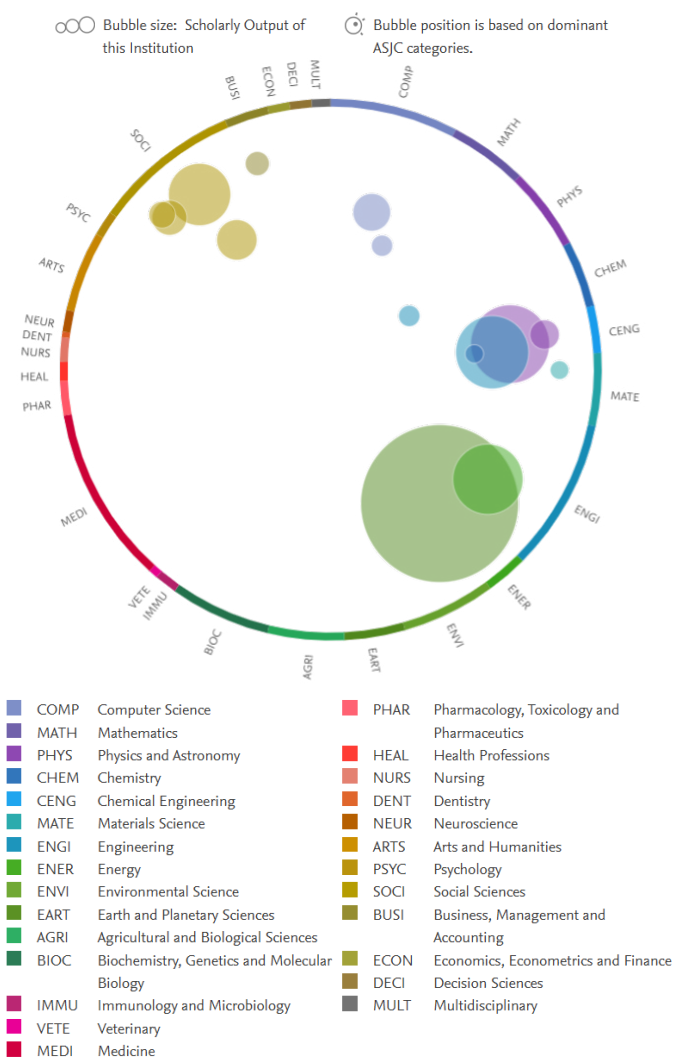
OUTPUTS & CITATIONS (2011–2025)
Since its inception in 2011, Nazarbayev University faculty members and researchers have released 10,852 peer-reviewed publications indexed by Scopus, and have been cited 190,382 times for the 2011-2025 period. The approximate number of citations per peer-reviewed publication is 17.5. The overall H-index of NU is 128, whereas H5-index is 88 (Source: SciVal, October 2025).

FIELD-WEIGHTED CITATION IMPACT (2022–2025)
The Field-Weighted Citation Impact of NU over 2022-2025 years is 2.59, meaning that our publications have been cited more than twice as often as would be expected based on the global average for similar publications.

COLLABORATION MATTERS
International collaboration is widely recognized as a key factor that positively influences citation metrics. By expanding professional networks and fostering global partnerships, collaboration often leads to the production of highly cited publications.

INTERNATIONAL COLLABORATION AT NU (2022–2025)
During the period from 2022 to 2025, NU exhibited a significant commitment to international collaboration, as evidenced by the production of 3,120 research papers in partnership with 3,348 organizations from 142 different countries. These collaborative efforts accounted for 61.7% of the total number of publications indexed by Scopus. The map above illustrates how these collaborations are spread throughout the world. The overall Field-Weighted Citation Impact of these co-authored papers is 3.44, reflecting the tendency of international collaborations to produce higher-impact, more widely recognized research.

FULL REPORT & CONTACT
For getting more comprehensive information on the research performance at NU, please have a look at the following report generated by [SciVal](#) research evaluation platform. If you have any questions regarding the provided information, please contact Saule Sadykova – ssadykova@nu.edu.kz



Sharing
Knowledge
Globally

Times
Higher
Education

Recently, two articles by Nazarbayev University experts were published in Times Higher Education (THE), sharing expert insights on PhD success and securing government research funding.

Navigating the PhD Journey: Practical Insights for Doctoral Success

A Author: Prof. Luis R. Rojas-Solórzano, Associate Provost for Graduate Studies at Nazarbayev University

We are proud to note the contribution of Prof. Luis R. Rojas-Solórzano, Associate Provost for Graduate Studies at Nazarbayev University, to the Times Higher Education (THE Campus) feature “Advice for Surviving Your PhD Dissertation,” a compendium of articles from international academics offering guidance to doctoral students worldwide.

His individual article – “How to Navigate the PhD Thesis” – distills decades of academic experience into practical, step-by-step recommendations. Prof. Rojas-Solórzano outlines how doctoral candidates can design effective work schedules, protect their well-being, structure the dissertation as a coherent and compelling research narrative, and prepare with confidence for the viva voce defense.

In his contribution to Times Higher Education (THE Campus), Prof. Rojas-Solórzano outlines seven essential dimensions of the doctoral writing journey:

Creating a detailed timeline with daily goals – Break down your thesis into manageable tasks, set daily objectives, and adjust plans as needed to maintain focus and productivity.

Understanding the PhD thesis – Become familiar early with institutional requirements and disciplinary expectations to guide your research effectively.

Writing the thesis – Begin with a draft outline, use digital tools for efficiency, start early to build momentum, and write in a voice authentic to your perspective.

Structuring your thesis – Follow the logic of the scientific method: abstract, introduction, literature review, methods, results, discussion, and conclusion, shaping your work as a compelling research narrative.

Managing referencing and bibliography – Apply citation styles consistently and accurately to ensure scholarly credibility.

Preparing for the viva voce – Rehearse with peers, remain composed during questioning, and treat the defense as a scholarly dialogue as well as an assessment.

You’ve completed your thesis – now what? – Celebrate the milestone, reflect on career aspirations, and plan the transition to the next stage of professional growth.

This structured guidance demonstrates that with strategic planning, resilience, and a positive mindset, doctoral candidates can navigate the challenges of thesis writing and make meaningful contributions to their fields

Brief author profile: *Luis R. Rojas-Solórzano is a specialist in computational fluid dynamics (CFD), multicomponent flow, clean energy; he teaches at Nazarbayev University, has experience in co-advising graduate students, and has a deep understanding of the dissertation preparation and management processes.*

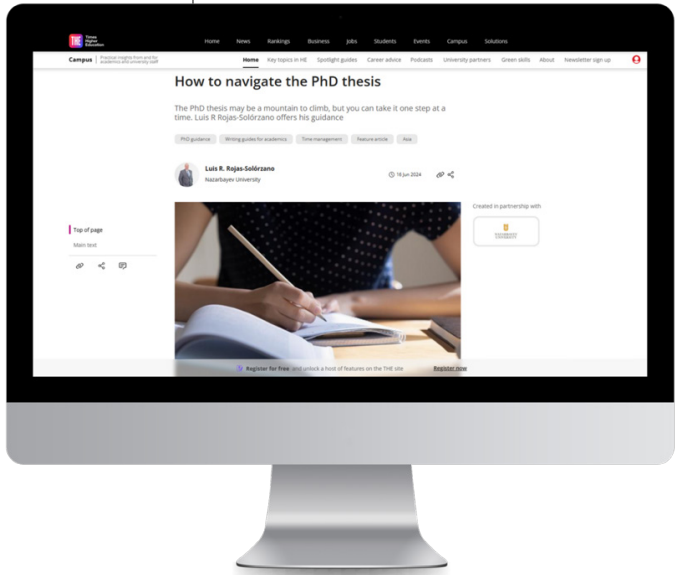


Times
Higher
Education



Inside
Higher
Ed

Read the full article



Nazarbayev University Experts Share Insights on Winning Government Research Funding in THE

A Yanwei Wang, Associate Professor and Head of Laboratory of Computational Materials Science
Baktiyar Soltabayev, Head of Laboratory of Advanced Sensors
Zhumabay Bakenov, Professor, Director of the Center for Energy and Advanced Materials Science, and Acting Vice-Provost for Research and Innovation

Nazarbayev University researchers have been featured in Times Higher Education (THE) with their article “Write a grant proposal to win government funding.” Congratulations to Yanwei Wang, Baktiyar Soltabayev and Zhumabay Bakenov for sharing their expertise with the global academic community!

At NU, researchers regularly compete for funding from the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan. These competitive calls are both gateways to opportunity and high-stakes tests of clarity, planning and research excellence. Drawing on their experience, NU experts share lessons for building stronger proposals applicable to government funding systems worldwide.

Understanding the Funding Landscape

Kazakhstan’s national research funding is structured into three main streams, each with distinct goals:
Young Researcher funding – empowers early-career scientists (aged 40 or under) to establish independence and leadership.
General Project funding – supports fundamental and applied studies by researchers at all stages.
Target Program funding – enables mission-driven initiatives addressing long-term national priorities.
Although their purposes differ, all proposals are evaluated on novelty, significance, feasibility, and alignment with national priorities.

Emphasising Novelty and National Relevance

Three elements consistently determine success:
Scientific novelty – Proposals must show how they push boundaries beyond existing knowledge, through innovative methods or new research questions.
National significance – Strong applications connect scientific contributions to Kazakhstan’s priorities such as energy transition, environmental management, digitalisation, and healthcare.
Broader impact and sustainability – Reviewers increasingly expect clear pathways to long-term benefits: industrial competitiveness, technology transfer, policy, or training.

These criteria echo global practices. For instance, the EU’s Horizon Europe and China’s dual-carbon strategy highlight how funding bodies worldwide direct research towards national and societal challenges.

Calendar Plan as the Roadmap

One of the most underestimated yet critical components is the calendar plan. Too often seen as a formality, it should instead

be treated as the roadmap of the project. Developing the plan early helps applicants translate ideas into concrete milestones, allocate resources effectively, and manage risks. Once approved, it becomes the benchmark against which progress is assessed.

Teams, Risks and Resilience

Building teams – Successful projects emphasise complementary expertise, mentorship for early-career researchers, and collaborations across disciplines or industries.
Risk management – Reviewers value honesty about uncertainties. Proposals that acknowledge risks and include mitigation strategies inspire confidence in their resilience.

Time, Deadlines, and Research Culture

Strong proposals take time, iteration, and internal deadlines well before official submission. For Kazakhstan, effective grant writing is not only about securing funding but also about building a sustainable research culture. For researchers, it is an investment in career growth; for society, it ensures that science delivers tangible benefits in areas such as energy, environment, health, and technology.

Ultimately, the value of grant writing lies beyond the proposal: in the discoveries, innovations, and societal progress it enables.

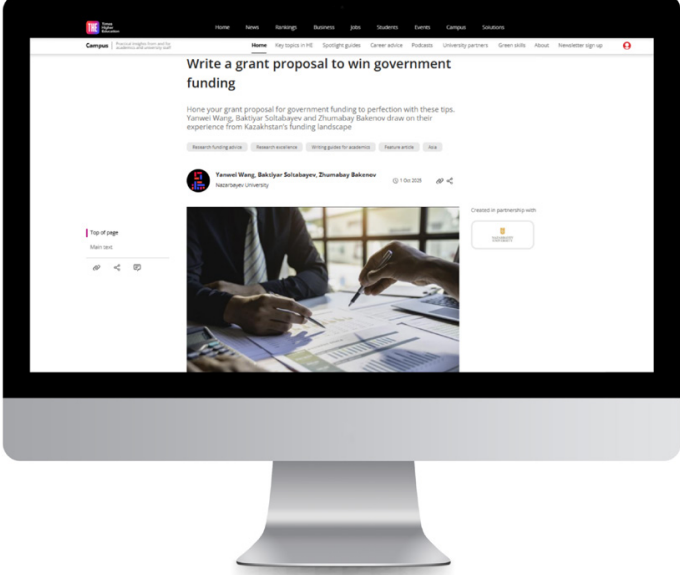


Times
Higher
Education



Inside
Higher
Ed

Read the full article



UNDP Delegation Explores Research Collaboration with Nazarbayev University

September 10, 2025

Nazarbayev University (NU) welcomed a high-level delegation from the United Nations Development Programme (UNDP) within the framework of the regional project “Enhancing Urban Resilience to Disaster and Climate Change Risks in Central Asia.” This flagship initiative, launched jointly with the Government of Japan in October 2024, is designed to help Central Asian cities adapt to climate challenges and strengthen resilience against disasters. The visit highlighted opportunities for long-term cooperation between NU and UNDP in research, innovation, and knowledge exchange.

THE DELEGATION

The UNDP team was represented by senior experts from the Istanbul Regional Hub:

- Mr. Khusrav Sharifov, Regional Team Leader (a.i.), Climate & Disaster Resilience Team
- Ms. Cansu Demir, Programme Analyst
- Mr. Sardor Kodirov, Regional Project Manager
- Ms. Chiho Okuda, Research and Knowledge Management Analyst
- Mr. Armen Chilingaryan, Chief Technical Advisor
- Mr. Ara Nazinyan, International Expert
- Ms. Adiya Karsybek, National Consultant, UNDP Kazakhstan

The programme opened with a laboratory tour led by Mr. Aidos Baumuratov, Director of Core Facilities and HPC, who introduced NU's cutting-edge research infrastructure.

PROJECT SCOPE AND COMPONENTS

The Urban Resilience Project is being implemented in five Central Asian countries – Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan, and Kyrgyzstan. In each, one pilot city was selected for intensive collaboration with local administrations and national ministries: Kazakhstan (Petropavlovsk), Tajikistan (Dushanbe), Turkmenistan (Ashgabat), Uzbekistan (Namangan), Kyrgyzstan (Osh).



THE PROJECT CONSISTS OF THREE KEY COMPONENTS:

- **Regional** – integrating resilience into urban planning methodology.
 - **City-Level** – socio-economic development strategies.
 - **Small Grants** – funding for implementing specific recommendations.
- In addition, UNDP is establishing a Central Asian Coalition of Cities to encourage peer learning, knowledge exchange, and the dissemination of best practices across the region.

COLLABORATION WITH NAZARBAYEV UNIVERSITY

Discussions at NU emphasized the growing role of technology particularly artificial intelligence (AI) in identifying hazards and shaping resilience strategies. Both parties explored the potential to combine UNDP's small grants with NU's matching grant modality, creating greater impact in pilot cities such as Petropavlovsk and beyond. As well as integrating UNDP methodology on Disaster Management to educational programs for NU students.

“By combining UNDP's global expertise and NU's research strengths, we can create impactful solutions to the urgent challenges of climate change and disaster resilience in the region,” said Prof. Zhumabay Bakenov, Acting Vice-Provost for Research and Innovation at NU.

TIMELINE

- Start: October 2024
- End: October 2027
- Duration: 3 years

PARTNERSHIP WITH NU

- Joint projects applying Artificial Intelligence, Civil engineering, Remote Sensing Technologies to urban resilience
- Combining NU's matching grants with UNDP's small grants
- Focus: Petropavlovsk → scalable to other Kazakhstani cities

A joint initiative of UNDP and the Government of Japan, aimed at building resilient and sustainable cities across Central Asia.

NU and DFG Open New Chapter in German–Kazakh Scientific Collaboration

September 16, 2025

Nazarbayev University (NU) welcomed a high-level delegation from the German Science Foundation (Deutsche Forschungsgemeinschaft, DFG) as part of the UDIF-HAW programme, a DFG initiative designed to build cooperation between German universities of applied sciences and international scientific organizations.



The delegation was led by **Prof. Dr. Karin Jacobs**, Vice President of DFG, and included:

Prof. Dr. Jörg Bagdahn – President of Anhalt University of Applied Sciences, Vice President of the German Rectors' Conference (HRK)

Dr. Jörn Achterberg – Programme Director, International Affairs

Dr. Elisa Braeckvelt – Programme Officer, International Affairs

Dr. Peter Liebelt – Head, CASIB



The visit was opened by Prof. Waqar Ahmad, President of NU, who emphasized the importance of strengthening international partnerships and supporting the next generation of researchers.

“NU is the leading research university in Central Asia. In addition to winning competitive research funds, we invest substantial amounts of our own resources into both maintaining world-class research infrastructure and supporting individual and collaborative projects. We look forward to strengthening our partnership with DFG, recognizing that this is a medium- to long-term endeavor with German universities,” – Prof. Waqar Ahmad, NU President

Prof. Dr. Karin Jacobs underlined DFG's strong interest in supporting long-term international collaborations: “Modern research is international. With the UDIF-HAW programme, DFG creates opportunities for German universities of applied sciences to work with leading institutions abroad. Nazarbayev University's research strengths make it a natural partner for us.”

Expanding Collaborative Research

The discussions highlighted 17 proposals for posters currently under consideration by DFG that involve NU researchers. These span NU's five critical research priorities:

- Socioeconomic transformation
- Artificial intelligence and smart systems
- Health and wellbeing
- New materials and technologies
- Energy and the environment

This strong alignment underscores the mutual interests of both institutions and the potential for long-term cooperation.

Laboratory Visits and Networking

The programme included tours of NU's cutting-edge laboratories, where the delegation learned about ongoing projects and state-of-the-art facilities. The visit provided opportunities for direct networking between NU researchers and the DFG representatives.



Background: UDIF-HAW Initiative

The UDIF-HAW programme (Networking for Research – German Universities of Applied Sciences and Researchers Worldwide) was launched in March 2025 to promote international collaboration between researchers from German universities of applied sciences (UAS) and partners in Central Asia, particularly Kazakhstan and Uzbekistan.

Through virtual matchmaking events, poster presentations, and delegation visits, the initiative fosters collaboration in areas such as:

- Digitalisation and Smart Technologies
- Sustainable Urban Development and Smart Cities
- Renewable Energy and Resource Management

So far, the programme has gathered over 230 poster contributions from Germany, Kazakhstan, and Uzbekistan, demonstrating the strong mutual interest in cooperation.

SPOTLIGHT ON SUCCESS: Zhanat Kappassov



AFFILIATION
Associate Professor

Department of Robotics and Mechatronics

School of Engineering and Digital Sciences (SEDS)

RESEARCH METRICS

H-index: 12

Research outputs: 37 publications

Citations: 1,094 (Scopus/Google Scholar)

Nazarbayev University at CLAWAR 2025: Tactile Robotics and International Partnership

A delegation from Nazarbayev University led by Assoc. **Prof. Zhanat Kappassov** participated in the 28th International Conference on Climbing and Walking Robots – **CLAWAR 2025**.

Dr. Kappassov served as a member of the International Scientific Committee and co-chaired the special session Touch 2025, dedicated to tactile sensing and haptic technologies in robotics.



NU CONTRIBUTIONS AT CLAWAR 2025

The NU team delivered **10 presentations**, showcasing cutting-edge research in tactile robotics, multimodal sensing, and AI-driven robot intelligence. Highlights included:

Next-generation tactile sensors – from biomimetic fingertips with variable friction to robust optical sensors for walking robots.

Assistive interfaces – HaptiComm-S20, a tactile communication device for people with combined hearing and vision impairments.

Multimodal wearable gloves – designed for firefighters, integrating tactile sensing with teleoperation functions.

Integration of vision- and language-based AI models (VLM/LLM) – enabling natural language navigation, terrain reasoning, and zero-shot manipulation using real-time haptic and visual feedback.

NU PRESENTATIONS AT CLAWAR 2025

- **Data Acquisition and Processing of Sub-Wavelength Signals using STM32F4 Discovery Board for Acoustics and Haptics** – Valeriya Kostyukova, Danissa Sandykbayeva, Zhanat Kappassov and Bakhtiyar Orazbayev.
- **Morphologically Biomimetic Variable Friction Fingertip** – Togzhan Syrymova, Kamila Spanova, Moldir Zabirowa, Artemiy Oleinikov, Juan Corrales Ramon and Zhanat Kappassov.
- **HaptiComm-S20: Development of Communication Device via Tactile Stimulation** – Nurlan Kabdyshev, Ilyas Umurbekov, Mounia Ziat, Sven Topp, Basil Duvernoy, Jeraldine Milroy, Daryn Kenzhebek, Berdakh Abibullaev and Zhanat Kappassov
- **LUCA: Look, Understand, Communicate, and Act – A Vision-Language System for Object-Oriented Navigation** – Jabrail Chumakov, Temirlan Galimzhanov, Soibkhon Khajikhanov, Zaki Al Farabi, Zhanat Kappassov and Amir Yelenov.
- **Precision Force-Controlled Puncturing of Multilayer Stretchable Membranes Using a Robotic Manipulator** – Soibkhon Khajikhanov, Jabrail Chumakov, Amir Yelenov, Ilyas Umurbekov, Temirlan Kaiyrbay, Zaki Al Farabi and Zhanat Kappassov.
- **Hybrid Planning for Autonomous Robots: A* with Vision-Language Terrain Reasoning** – Temirlan Galimzhanov, Jabrail Chumakov, Amir Yelenov and Zhanat Kappassov.
- **Orientation and Direction Estimation of the Object Movement using Tactile Sensor** – Moldir Zabirowa, Valeriya Kostyukova, Togzhan Syrymova, Kamila Spanova, Jabrail Chumakov and Zhanat Kappassov.
- **Multimodal Wearable Tactile System for Augmented Reality and Mobile Robot Teleoperation Applications** – Yermakhan Kassym, Madina Turmagambetova, Soibkhon Khajikhanov, Togzhan Syrymova, Temirlan Kaiyrbay, Ilyas Umurbekov, Kamila Spanova and Zhanat Kappassov.
- **Zero-Shot Reasoning With Haptic and Visual Feedback in Vision-Language-Action Robotic Manipulation** – Amir Yelenov, Ilyas Umurbekov, Daryn Kenzhebek, Jabrail Chumakov, Temirlan Galimzhanov and Zhanat Kappassov
- **A Durable Optical Tactile Sensor for Applications in Walking Robots** – Daryn Kenzhebek, Madina Yergibay, Amir Yelenov, Tleukhan Mussin, Temirlan Kaiyrbay, Zaki Al Farabi, Tasbolat Taun-yazov, Zhanat Kappassov and Ilyas Tursynbek

NU-SZTU Joint Seminar

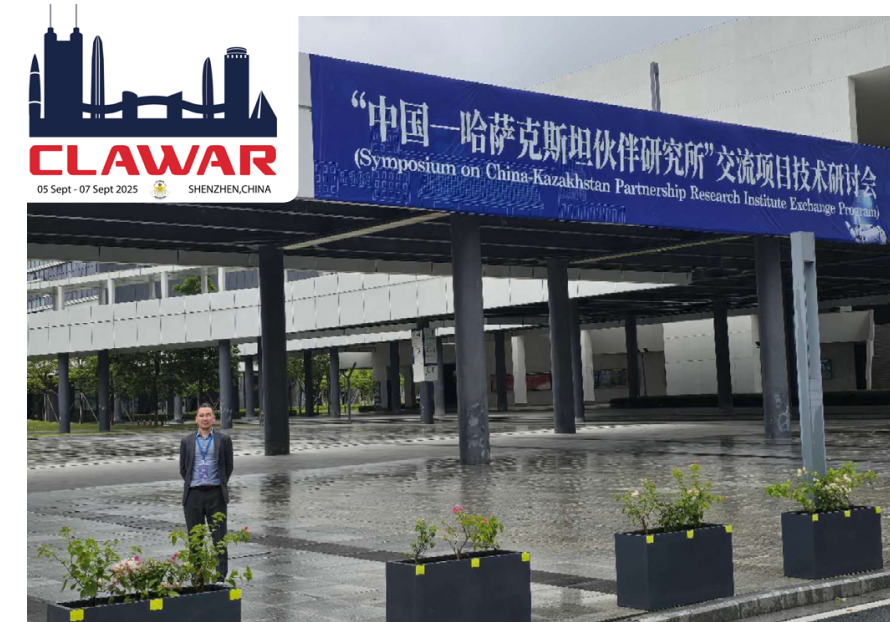
Alongside CLAWAR 2025, NU's delegation participated in a technical seminar under the **China–Kazakhstan Partner Research Institute project**, hosted by Shenzhen Technology University (SZTU).

A total of 13 joint presentations were delivered, including by NU's young researchers: Ilyas Tursynbek, Togzhan Syrymova, Amir Yelenov, Jabrail Chumakov, Nurlan Kabdyshev, and Temirlan Galimzhanov.

Discussions covered embodied intelligence, tactile sensing, dexterous manipulation, and human–robot interaction.

The project, launched in January 2025 with support from China's Ministry of Science and Technology, is co-led by Prof. Qiang Li (SZTU) and Assoc. Prof. Zhanat Kappassov (NU).

Future collaboration will focus on tactile sensing, intelligent robot control, and next-generation communication technologies (5G-Adv/6G).



IMPACT FOR NAZARBAYEV UNIVERSITY

Participation in CLAWAR 2025 and collaboration with SZTU highlight NU's growing international leadership in tactile robotics and AI-driven perception. The research presented by Dr. Kappassov's group strengthens NU's global reputation, fosters the next generation of Kazakhstani scientists, and builds a foundation for long-term cooperation within the Belt and Road initiative.



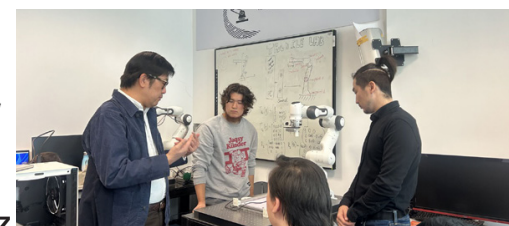
Revolutionizing Delivery and Speech Development

Zhanat serves as Scientific Advisor to two innovative startups, based on the Tactile Robotics Laboratory he founded:

- **Robo-Kiosk with Drone-Port for goods delivery;**
- **TouchTalk for kids' speech development assistance.**

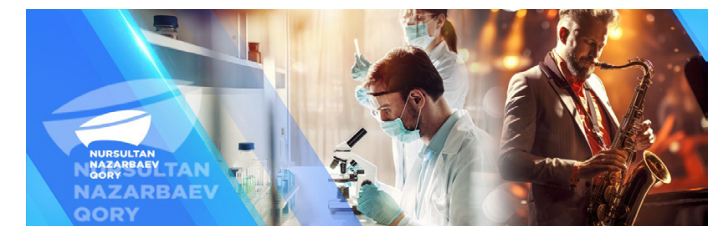


tact.nu.edu.kz



Congratulations on a Prestigious Award!

Nazarbayev University proudly congratulates Professor Zhanat Yerulanovich Kappassov, Head of the Tactile Robotics Laboratory at the School of Engineering and Digital Sciences, on being awarded the **Nursultan Nazarbayev Foundation Prize for Outstanding Achievements in Science and Technology**.



SPOTLIGHT ON SUCCESS:

Nurxat Nuraje

We are proud to share that professor Nurxat Nuraje attended the meeting of the National Council on Science and Technology, held on September 26, 2025, with the participation of the Head of State, President Kassym-Jomart Tokayev.



The President emphasized the strategic importance of science and technology for every nation, highlighting that the position of any country in the modern world is defined by its level of scientific development. He underlined that Kazakhstan must focus on innovation, digital transformation, and the full potential of artificial intelligence to achieve sustainable progress.



President Tokayev:

"It is time for investments, knowledge, and high technologies. Economic growth is directly linked to science – this is an axiom."



We are inspired by this national vision and proud to see NU researchers, including Professor Nuraje, actively contributing to shaping the future of Kazakhstan's science and technology

*Nazarbayev University proudly congratulates Professor Nurxat Nuraje on being awarded the prestigious title of **Honorary Professor of E.A. Buketov Karaganda University**.*

Science at the Crossroads of Nanotechnology and a Sustainable Future

Nurxat Nuraje, PhD, is a professor at Nazarbayev University and one of Kazakhstan's leading researchers in nanomaterials, sensing technologies, and sustainable energy. He currently holds several key positions:

- Head of Renewable Energy Laboratory, National Laboratory Astana (NLA)
- Director of the PhD Program in Chemical Engineering
- Professor, Department of Chemical and Materials Engineering, School of Engineering & Digital Sciences
- Head of the company "TEQNOVATE" LLP. Project implementation & commercialization in Smart Polymers & Membranes, Biomass Conversion.



@teqnovate

From New York to Astana

Prof. Nuraje earned his PhD in Chemistry from The City University of New York, followed by postdoctoral research at the Massachusetts Institute of Technology (MIT) in Materials Science.

His academic journey also included positions at Texas Tech University before joining Nazarbayev University, where he quickly rose to become a Full Professor and Head of the Renewable Energy Lab.

IN KAZAKHSTAN, HIS WORK HAS BEEN EQUALLY CELEBRATED:

- Member of the **National Council on Science and Technology** under the President of Kazakhstan.
- Member of the **National Scientific Council** in the priority area **Energy, Advanced Materials, and Transport**.
- Awarded the title of **Honorary Professor of E.A. Buketov Karaganda University**.

4th International Symposium on Emerging Materials and Devices

Under the leadership of Professor Nurxat Nuraje, the Renewable Energy Laboratory at National Laboratory Astana, Nazarbayev University annually hosts the International Symposium on Emerging Materials and Devices, now in its fourth edition.

INVITED SPEAKERS

This year's symposium welcomed more than 16 distinguished professors from across the world. Among them were globally recognized leaders whose pioneering work continues to shape the field:

- Prof. Hiroshi Matsui, Cornell University, USA
- Prof. Chuanyi Wang, Shaanxi University of Science and Technology, China
- Prof. Rafael Luque, National University of Science and Technology Politehnica, Bucharest

- Prof. Alina-Mariana Balu, University of Córdoba, Spain
- Prof. Zhanhu Guo, Northumbria University, UK

CONFERENCE THEME

The symposium highlights emerging materials and devices with a special focus on newly discovered or applied materials that hold promise to address pressing global challenges and improve quality of life in fields such as energy, environment, medicine, and advanced manufacturing.

By consistently convening such high-level experts, the symposium strengthens Nazarbayev University's reputation as a hub for cutting-edge research, global dialogue, and international collaboration in materials science and engineering.



Renewable Energy Laboratory: Driving Innovation in Green Technologies



The Renewable Energy Laboratory Team
[Visit the lab web page](#)

The Renewable Energy Laboratory (REL) at Nazarbayev University, led by Professor Nurxat Nuraje, is a cutting-edge research hub dedicated to developing novel solar-sensitive and multifunctional materials. The lab tackles fundamental and technical challenges in solar cells, solar fuels, biomass conversion, hydrogen generation, storage, and sensor technologies—advancing solutions with real-world applications.



ID Nurxat Nuraje

ACADEMIC PROFILE:

- H-index: 29.
- Nearly 130 publications in Scopus and Web of Science-indexed journals.
- Since 2012, he has supervised PhD candidates in physics and nanotechnology, many of whom now hold positions at leading universities in Kazakhstan.
- Around 20 co-authored publications with faculty and PhD students from Karaganda University.

KEY ACHIEVEMENTS

- Breakthrough in hydrogen sensing: development of polymer nanocomposite-based sensors with a sensitivity of 5 ppm, ten times higher than conventional standards.
- Ranked among the top 0.5% of scientists worldwide in nanomaterials.
- Leader of major international research projects in green energy and sustainable development.

Shedding Light on the Shadows: Understanding Private Tutoring in Rural Kazakhstan

ID Anas Hajar, PhD Associate Professor of Multilingual Education



A new study published in the British Educational Research Journal examines the growing phenomenon of fee-based private tutoring (“shadow education”) among primary school students in rural Kazakhstan.

[Read the Full Article](#)



A new study in the Q1 British Educational Research Journal is the first in Central Asia to center rural children’s own voices on fee-based private tutoring (“shadow education”). Surveying 662 Grade-6 pupils and using participatory interviews and drawings (N=60), the research finds 43.5% receive tutoring—mainly small-group sessions for affordability—with benefits for subject understanding and confidence but trade-offs in leisure time and family budgets.

Researchers at Nazarbayev University’s Graduate School of Education have published the first mixed-methods study to examine fee-based private tutoring among primary-age students in rural Kazakhstan, foregrounding children’s own perspectives. The paper “Examining the nature, effectiveness and implications of shadow education in rural Kazakhstan: A participatory study of primary school students” appeared online on 22 May 2025 in the British Educational Research Journal

Guided by Bronfenbrenner’s ecological theory and the “new sociology of childhood,” the study combined a structured survey (N=662) with participatory methods—focus-group interviews and children’s drawings (N=60) in seven mainstream schools serving rural communities around Astana, Almaty, and Semey.

WHAT THE TEAM FOUND

Participation: 43.5% of pupils received fee-based tutoring in the previous 12 months.

Format & access: Small-group, face-to-face sessions were most common (35.2%), reflecting affordability in rural settings; ~27% reported online tutoring.

Purpose: Unlike urban peers who often prepare for high-stakes selection, rural pupils mainly sought tutoring to deepen subject understanding and improve day-to-day school performance. Only

~6.6% cited preparation for selective school entrance exams.

Affordability: 60.7% of tutored pupils reported monthly spending of ≤ 20,000 KZT, largely due to group formats and lower rural pricing.

Perceived benefits & trade-offs: Children described greater confidence, clearer explanations, and better communication skills, alongside reduced leisure time and, for some families, financial strain.

Dr. Anas Hajar, Associate Professor at GSE and Chair of the Research Committee, said:

“Rural children told us clearly and creatively that tutoring is less about cramming for elite selection and more about making everyday learning click. Their voices should inform how we design support in underserved areas.”

Co-author Mehmet Karakus added:

“Policy needs to meet pupils where they live: strengthen rural school resources, ensure transparent and affordable tutoring, and expand equitable preparation routes online and in-school so geography and income don’t set a child’s ceiling.”

THE AUTHORS RECOMMEND:

- 1 Investing in teacher capacity and learning resources in rural schools;
- 2 Offering free or subsidized preparatory programs and hybrid online options outside major cities;
- 3 Clearer regulation to avoid conflicts of interest when schoolteachers tutor their own pupils; and
- 4 Monitoring pupils’ well-being and time-use, not just test scores.

Rethinking the Computer Mouse: NU Research Calls for Ergonomic Revolution

ID Jose Berengueres, Associate professor, School of Engineering and Digital Sciences



Nearly 60 years after its invention, the computer mouse has hardly changed – and this may be harming millions of users.

[Read the full article](#)



A new study led by Associate Professor Jose Berengueres, School of Engineering and Digital Sciences, Nazarbayev University (NU), highlights the urgent need to redesign the mouse to better fit the human hand and prevent long-term injury.

GLOBAL COLLABORATION

This project brought together expertise from Kazakhstan, Sweden, and Australia, reflecting NU’s growing role in tackling global health and technology challenges.

THE CHALLENGE

While computing technology has advanced at lightning speed, the mouse remains almost frozen in its original 1960s design. Its flat, rigid geometry forces the hand into unnatural positions, contributing to chronic discomfort and repetitive strain injuries (RSI). Studies show that nearly 20% of users develop a chronic disorder linked to input devices and posture.

WHY IT MATTERS

Repetitive strain injuries are a growing concern worldwide, especially for young people who spend long hours at computers or gaming. Healthier device design could improve wellbeing, reduce medical costs, and boost productivity across industries.

THE RESEARCH

Professor Berengueres surveyed students at KTH Royal Institute of Technology (Sweden): 11 out of 28 reported chronic discomfort from mouse use, with four already clinically diagnosed with RSI. Most were gamers under the age of 30.

WHAT IS NEXT

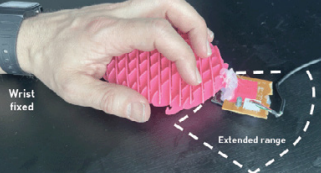
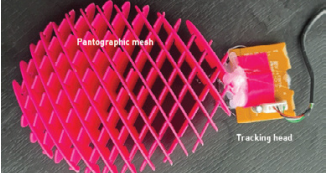
With 3D printing, flexible electronics, and advanced materials, researchers see an opportunity to create customizable mice that adapt to hand size and movement.

TO TEST ALTERNATIVES, HE DEVELOPED TWO PROTOTYPES:

- 1 Fleximouse a squeezable, mesh-body design encouraging a natural palmar grasp.
- 2 A-frame hinge mouse – created with Tony Yu, University of Melbourne, this vertical design reduced strain and proved more practical and cost-effective.



Prof. Berengueres: *“The mouse is long overdue for reinvention. Done right, it could make computing healthier and more comfortable for millions.”*



A key insight: fit matters. Even a 1-centimeter difference in hand size changed the comfort and usability of ergonomic mice. Unlike rigid designs, flexible devices demand size adjustment or customization.

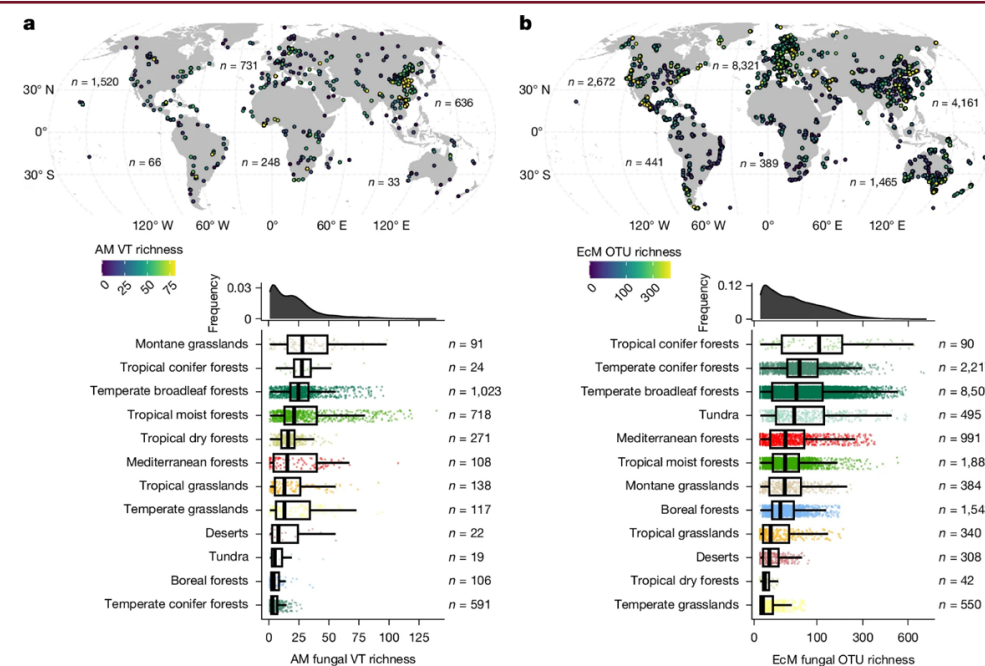


Contribution to a Nature publication on Global Mycorrhizal Fungi

Global mapping of mycorrhizal fungi based on nearly 25,000 soil samples from 130 countries, comprising over 2.8 billion DNA sequences. Among them soil DNA isolated at Nazarbayev University by researcher Aigerim Soltabayeva, representing Kazakhstan's biodiversity in this worldwide dataset (Fig. 1).

In July 2025, Nature published a groundbreaking article from the SPUN (Society for the Protection of Underground Networks) Mapping Consortium one of the first global-scale efforts to chart the biodiversity of mycorrhizal fungi, organisms vital for soil health, plant growth, and resilience under stress. Among the co-authors and affiliations of this landmark publication is Dr. Aigerim Soltabayeva.

[Read the Full Article](#)



Global map of mycorrhizal fungal diversity. DNA samples from Kazakhstan, processed at Nazarbayev University, contributed to the worldwide dataset guiding conservation priorities

Kazakhstan's biodiversity represented in landmark global study on soil fungi

KAZAKHSTAN'S CONTRIBUTION

Dr. Soltabayeva joined the project in 2023, following an introduction by her colleague, Dr. Vadim Yapiiev, to Dr. Bethan Manley from SPUN. That summer, soil samples were collected from different regions of Kazakhstan. The DNA isolation from these soils was carried out at Nazarbayev University's laboratories, ensuring that Kazakhstan's biodiversity would be represented in the global dataset.

OVERCOMING CHALLENGES

Specializing in DNA extraction from plant tissues, Dr. Soltabayeva adapted protocols to soil a task she had never undertaken before. Without access to specialized equipment, she engineered a custom bead-beating system using

a vortex, tape, and racks, successfully producing high-quality DNA free from contamination. Within a month, the samples were processed and shipped to the United States. Overcoming the bureaucratic hurdles of exporting biological material from Kazakhstan made the achievement even more significant.

FROM LOCAL EFFORTS TO A GLOBAL STAGE

What began as a practical contribution providing high-quality DNA extractions grew into a collaboration of worldwide importance. Two years later, the project culminated in a Nature publication, a milestone in Dr. Soltabayeva's career. Her contribution highlights both Kazakhstan's unique biodiversity and the essential role of scientific networks.

"This experience shows how collaboration and trust can transform small acts of support into part of a global achievement. It is an honor to see Kazakhstan represented in such an important project."



Researchers at Nazarbayev University, together with an international collaborator from Russia/China, use AI to predict CO₂ diffusion in brine

[Read the Full Article](#)

Published: 31 July 2025

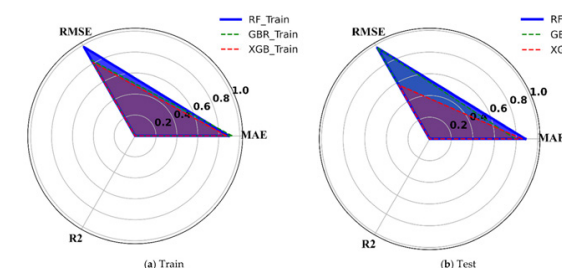


Figure 1. Radar chart comparing RF, GBR, and XGBoost models on RMSE, MAE, and R^2 metrics for training and testing datasets, highlighting their prediction accuracy.

Machine Learning Prediction of CO₂ Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions

ID [Qaiser Khan](#), [Peyman Pourafshary](#), [Fahimeh Hadavimoghaddam](#), [Reza Khoramian](#)

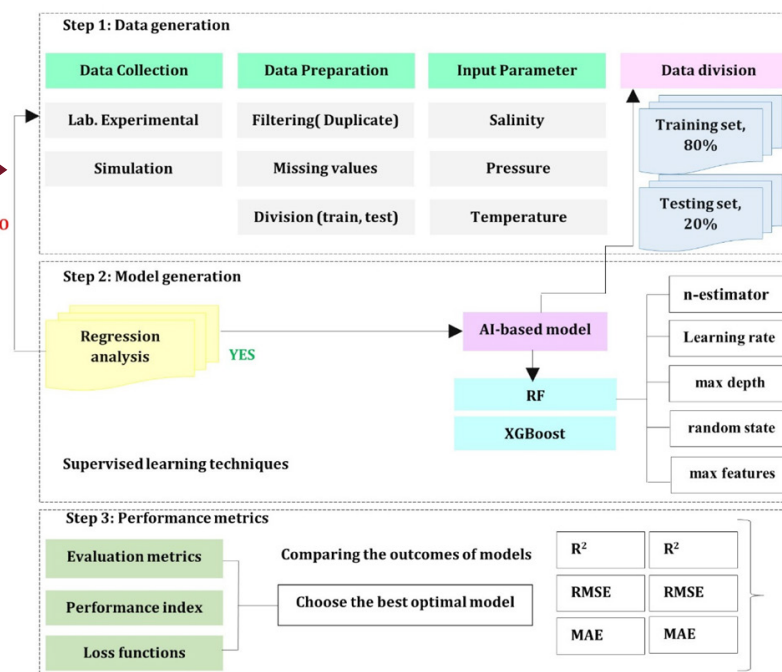


Figure 2. Workflow of the machine learning framework for CO₂ DC prediction.

IN SIMPLE TERMS

Carbon dioxide (CO₂) is one of the main greenhouse gases causing climate change. To slow global warming, scientists are exploring ways to store CO₂ safely underground in deep saltwater reservoirs. But until now, predicting how CO₂ behaves under real geological conditions has been difficult and expensive. A new study shows that artificial intelligence (AI) can do this job faster, cheaper, and with remarkable accuracy opening the door to more reliable climate solutions.

STUDY HIGHLIGHTS

- Temperature is the strongest driver of CO₂ diffusion.
- High salinity reduces diffusion by up to 65%, slowing storage efficiency.
- The models cut the need for costly laboratory experiments and deliver faster, more accurate forecasts for CCS operations.

HOW IT WORKS

The research team led by Dr. Peyman Pourafshary (Nazarbayev University, Kazakhstan) applied advanced machine learning (ML) algorithms together with colleagues from Russia (Chemical Engineering Department, Ufa State Petroleum Technological University) and China (Institute of Unconventional Oil & Gas, Northeast Petroleum University, Daqing 163318), Random Forest, Gradient Boost Regressor, and XGBoost to predict how carbon dioxide dissolves and spreads in brine under reservoir conditions.

Using 176 high-quality experimental and simulation data points, the models analyzed the effects of pressure, temperature, and salinity on the diffusion coefficient (DC) of CO₂. The Random Forest model achieved the highest accuracy ($R^2 = 0.95$).

WHY IT MATTERS

Climate impact: Secure CO₂ storage is essential for achieving global net-zero targets.

Industry relevance: Reliable predictions improve the design of CCS projects and CO₂-Enhanced Oil Recovery (EOR).

Public safety: Better models reduce the risk of CO₂ leakage, ensuring long-term environmental security.

WHY IT IS UNIQUE

Unlike earlier studies that relied on small datasets or narrow conditions, this research:

- Integrates a larger and more diverse dataset (176 points).
- Demonstrates superior accuracy with the Random Forest model.
- Provides interpretability through SHAP analysis, showing clearly which parameters matter most.
- Represents international collaboration across Kazakhstan, Russia, and China.

Negative nominal rates

 Prof. Julio Dávila, Department of Economics



New Research Demonstrates the Possibility of Negative Nominal Interest Rates in General Equilibrium with Financial Intermediation

[Read the Full Article](#)



A new study published in the *Journal of Financial Stability* (Scopus 98%) challenges conventional wisdom about the “zero lower bound” on interest rates. The article, “Negative nominal rates” by Professor Julio Dávila (Nazarbayev University, School of Sciences and Humanities, Economics Department) and Dr. Elizaveta Lukmanova (Central Bank of Ireland), demonstrates that negative nominal rates can arise naturally in a general equilibrium model with financial intermediation.

KEY FINDINGS

This paper shows the possibility of negative nominal interest rates in a general equilibrium model with financial intermediation. It establishes that the decentralization of the best steady state requires:

- a zero nominal lending rate on bank loans to firms, and
- a negative nominal lending rate on central bank loans to banks.

The research also finds that implementing the best steady state requires firms to be bound by collateral requirements that limit their leverage.

The key driver of the results is the defining characteristic of banking: banks’ ability to create money by opening deposit accounts that borrowers can withdraw from, even when unbacked by household deposits.

BROADER SIGNIFICANCE

The model’s implications are consistent with historical empirical trends in the United States and help rationalize the ultra-low interest rate policies implemented by major central banks during 2014–2022.

Specifically, the study examines both equilibrium and first-best allocations, finding that:

While banks stimulate capital accumulation and output, the best steady state cannot generally be reached as a pure market outcome if the central bank focuses only on nominal rates.

The utilitarian social planner’s allocations can, however, be decentralized if collateral requirements are also imposed.

Market implementation of the planner’s steady state requires a zero nominal rate for bank loans to firms and a negative nominal rate for central bank loans to banks.

The research highlights how bank money creation allows households to bridge the gap between their willingness to trade today’s consumption for tomorrow’s and the actual return on deposits or capital. Without this mechanism, firms would face tighter credit, higher investment costs, and households would inefficiently delay consumption—moving the economy away from the socially optimal allocation.

RESEARCH CONTEXT

This publication builds on Prof. Dávila’s FDCRGP project: “Monetary policies and the leverage cycle without a zero lower bound for interest rates” (2022–2024).



CONTACT INFORMATION

For further details, interviews, or access to the full article, please contact:

Prof. Julio Dávila,
Department of Economics,
Nazarbayev University
julio.davila@nu.edu.kz

Dr. Elizaveta Lukmanova,
Central Bank of Ireland
Elizaveta.lukmanova@centralbank.ie

Global South mobility to Central Asia: why Indian medical students choose Kazakhstan and how that shapes language use

 Kymbat Yessenbekova, Anas Hajar, Daniel Hernández-Torrano



GSE researchers shine a spotlight on South–South student mobility with a case study of Indian medical undergraduates in Kazakhstan.

[Read the Full Article](#)





Kymbat Yessenbekova: “Students’ choices are pragmatic—career, costs, and safety drive the move—and once here, language practice follows function: Russian helps them navigate everyday academic and social life.”

A PhD candidate, Kymbat Yessenbekova, together with her advisors, Dr. Anas Hajar and Dr. Daniel Hernández-Torrano, has successfully published several papers in Q1 journals based on her doctoral research. One notable example was published online on 30 May 2025 in the journal *Globalisation, Societies and Education*.

Conducted at two northern-Kazakhstan universities offering English-Medium Instruction (EMI) in medicine, the study used a convergent mixed-methods design survey (N=158) plus semi-structured interviews (N=10) to map the motivations behind destination choice and the language practices that follow.

WHAT BRINGS STUDENTS TO KAZAKHSTAN?

Participants pointed to a pragmatic mix of career opportunity, affordability relative to other destinations, personal safety (especially salient for women and their families), and cultural exploration. Many were first in their families to study abroad, financing education via family savings or loans underscoring practical rather than prestige-only decision-making.

HOW DOES THAT SHAPE LANGUAGE USE?

While English remains the classroom medium, the multilingual reality of daily life means Russian often functions as the working language with peers, staff, and services; reported interest in learning Russian outpaced Kazakh. Quantitative analyses linked stronger world-enlightenment and personal-growth motivations with greater interest in both local languages, while career motives were less tied to language learning per semester.

WHAT IT MEANS:

The findings position Kazakhstan not only as an EMI provider but as a regional education hub where motivations and the lived linguistic environment interact. The authors suggest fast-start survival Russian/Kazakh for EMI cohorts, multilingual student-facing services, and career-linked bridges (mentored clinicals, employer talks) that respect EMI while acknowledging multilingual practice.

OUR PUBLICATIONS:

Mapping research on International Student Mobilities in higher education: Achievements and the agenda ahead. [Link](#)

Unpacking Syrian international students’ expectations, challenges and future selves in Kazakhstan: a qualitative inquiry. [Link](#)

CONCLUSION

Kazakhstan offers competitive conditions for international study safety, affordability, and a favourable climate but fully realising this potential will require addressing language-related challenges through mutual, intercultural approaches that involve both students and local stakeholders. These results underscore the value of integrating motivational factors when designing language-learning and cultural-adaptation support.

Building on these findings, integrated language + cultural immersion programmes could strengthen students’ personal growth and global outlook while deepening regional connection. Further research should examine language challenges across academic and social settings. Given strong career motivations (notably in medicine), universities should build stronger links to local industries and international employers to expand career development and attract future cohorts.

LIMITATIONS AND FUTURE DIRECTIONS

Sample & design: A modest qualitative sample and a cross-sectional design limit generalisability and mask change over time.

Scope: Focusing on a single nationality narrows interpretation; comparative cohorts would enrich insights.

Next steps: Longitudinal studies tracking academic, linguistic, and sociocultural trajectories; multi-national samples to map how motivations and language practices vary across groups; mixed-methods work that probes identity negotiation in multilingual EMI contexts.

What we learned: Students’ non-career motives (curiosity, growth, culture) drive local-language uptake; career motives alone don’t.

Why it matters: Supporting EMI students in Kazakhstan means pairing English-medium teaching with realistic multilingual pathways.

DO NOW (FOR UNIVERSITIES):

- Launch fast-start survival Russian/Kazakh tied to real campus/admin tasks.
- Provide multilingual student services and peer mentoring.
- Offer career-linked placements/clinicals and employer talks tailored to international cohorts.
- Run cultural immersion modules co-designed with students.

Mathematics and Chemical Engineering NU Students prevent formation of dead zones



The optimal control methods for reaction processes in catalyst pellets and catalytic membrane reactors require advanced Mathematics. The desired target function (yield, selectivity, effectiveness factor) is usually optimized using the combination of the catalyst activity distribution, forced deactivation/activation of catalyst sites located on the inner surface of the porous granules, and forced temporal variation of process parameters.

Research by NU students has advanced the understanding of dead-zone formation phenomena. Their work is critical for optimizing expensive catalyst materials to prevent the formation of dead zones in chemical reactors. The dead core is a zone where no chemical reaction occurs due to the lack of reactants. The formation of dead zones has been reported in various applications such as propylene hydrogenation on commercial catalysts, power generation in microbial fuel cells, and bioreaction in catalytic particles containing immobilized enzymes.

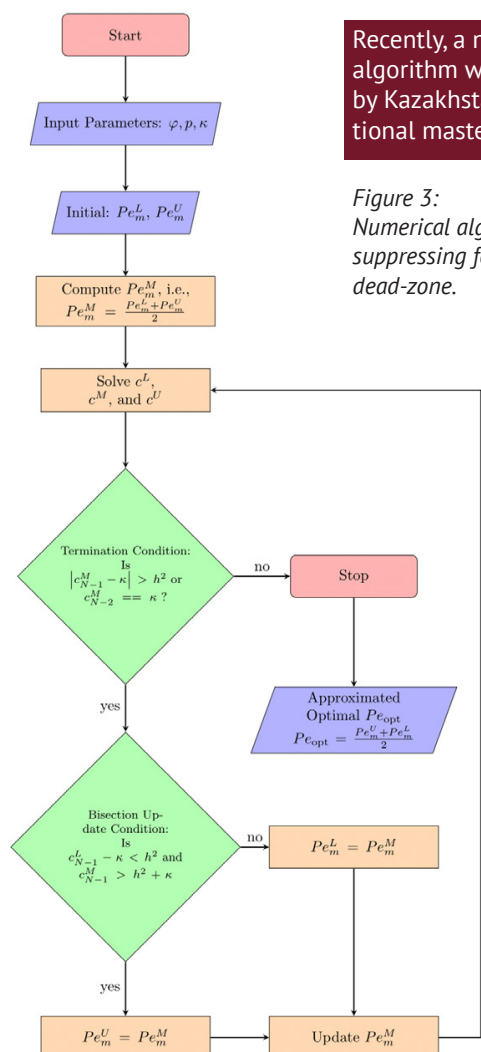
In the interdisciplinary research projects of **Mathematics Department** and **Chemical and Materials Engineering Department** NU Students under the lead of Prof. Piotr Skrzypacz and Prof. Boris Golman developed analytical and numerical methods for solving the steady-state and non-steady-state reaction diffusion-convection problems with and without dead zones. Modelling and numerical analysis is aimed at design and optimization of chemical reactors.



ID Piotr Sebastian Skrzypacz, School of Sciences and Humanities



ID Boris Golman, School of Engineering and Digital Sciences



Recently, a new numerical algorithm was developed by Kazakhstani and international master's students.

Figure 3: Numerical algorithm for suppressing formation of dead-zone.

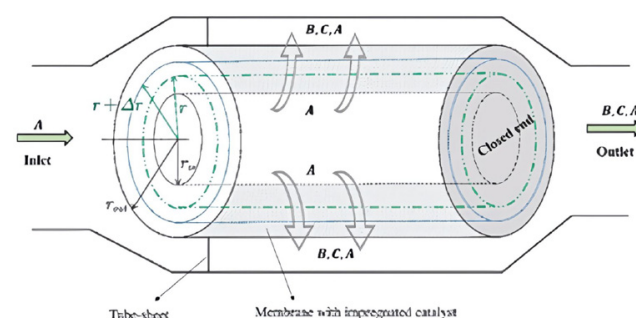


Figure 1: Flow-through catalytic membrane reactor.

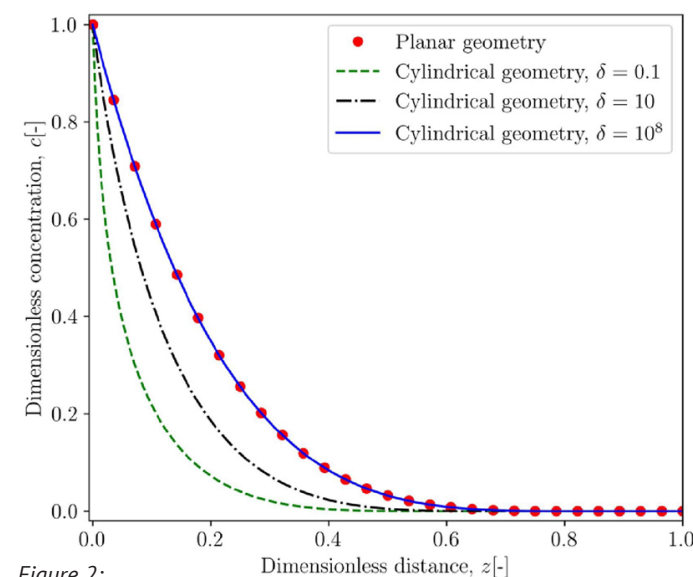


Figure 2: Concentration profiles with dead-zones.



Askar Amirali and Qaisar Abbas. The outcomes of intensive study of reaction-diffusion problem with reaction kinetics of power-law type were published in Q1 top 10% journal:

P. Skrzypacz, Q. Abbas, S. Szafert, V. Andreev, A. Amirali, B. Golman: *Avoidance of dead-zone formation in flow-through catalytic membrane reactor*
Engineered Science, 2025, 36, 1646
<https://dx.doi.org/10.30919/es1646>
Q1 97th 14/665 in Applied Mathematics Scopus
Impact Factor: 7.7

This is already the second paper co-authored by Qaiser. The outcomes of his Master Thesis have been already published in the Q1 Chemical Engineering Science.

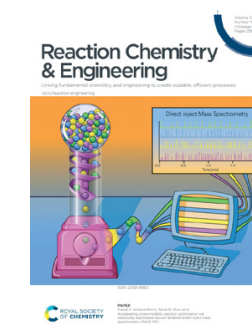
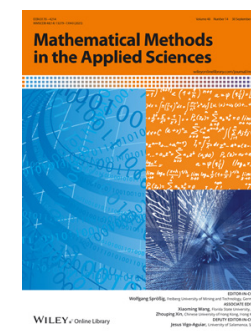
Q. Abbas, B. Golman, P. Skrzypacz: *Modeling and numerical analysis for cylindrical flow-through catalytic membrane reactor with power-law reaction kinetics: Revealing dead-core phenomena.*
Chemical Engineering Science 2024 May 31:120283
<https://doi.org/10.1016/j.ces.2024.120283>
Q1 83rd 65/402 Scopus
Impact Factor: 4.3

The work is a continuation of research on dead-zone formation in catalytic flow-through membrane reactors. The developed time-marching scheme is the only one that can efficiently approximate dead-core solutions. Further analytical results based on outcomes of Capstone Projects or Master Theses have been published in Q1 journals:

P. Skrzypacz, S. Szafert, I. Dossayev, B. Kabduali, B. Golman, V. Andreev, G. Ellis: *Critical Thiele modulus for diffusion-reaction problems in catalyst slabs with generalized Langmuir-Hinshelwood kinetics*
Mathematical Methods in the Applied Sciences, 2025
<https://doi.org/10.1002/mma.11138>
Q1 93rd 29/414 Scopus in General Mathematics
Impact Factor: 1.8

S. Kazbek, A. Kabiyeva, V. Andreev, P. Skrzypacz, B. Golman: *Catalyst pellets with Gaussian activity distribution under forced periodic operation for reactions with Langmuir-Hinshelwood kinetics*
Chemical Engineering Science, 2024, 120945,
<https://doi.org/10.1016/j.ces.2024.120945>
Q1 83rd 65/402 Scopus
Impact Factor: 4.3

P. Skrzypacz, B. Kabduali, B. Golman, V. Andreev: *Dead-core solutions and critical Thiele modulus for slabs with distributed catalyst and external mass transfer*
Reaction Chemistry and Engineering (Royal Society of Chemistry), 8, 758 (2023)
<https://doi.org/10.1039/D2RE00487A>
Q1 78th 21/97 Scopus
Impact Factor: 3.1



P. Skrzypacz, B. Kabduali, A. Kadyrbek, S. Szafert, V. Andreev, B. Golman: *Analysis of dead-core formation in catalytic reaction and diffusion processes with generalized diffusion flux*
Scientific Reports (Nature), 12, 22439 (2022)
<https://doi.org/10.1038/s41598-022-26786-8>
Q1 89th 22/200 Scopus
Impact Factor: 4.3

5th most-cited journal in the world with more than 834,000 citations in 2024

P. Skrzypacz, A. Kadyrbek, B. Golman, V. Andreev: *Dead-core solutions to fast diffusion-reaction equation for catalyst slabs with power-law reaction kinetics and external mass transfer resistance*
Chemical Engineering Journal, 446 (2022) 136722
<https://doi.org/10.1016/j.ces.2022.136722>
Q1 97th 7/274 Scopus
Impact Factor: 13.2

P. Skrzypacz, N. Chalkarova, B. Golman, V. Andreev, F. Schieweck: *Numerical simulations of dead zone formation in the catalytic flow-through membrane reactor.*
Computers and Chemical Engineering, 107368, 2021
<https://doi.org/10.1016/j.compchemeng.2021.107368>
Q1 82nd 49/274 Scopus
Impact Factor: 3.9

The published papers encompass investigations of critical Thiele moduli for problems with generalized diffusion fluxes, distributed catalyst or with Langmuir Hinshelwood reaction kinetics. The approximation of the critical Thiele modulus found by NU Students Bek Kabduali and Iliyas Dossayev reads as follows

$$\phi_s(n, \lambda) = \frac{\sqrt{2(n+1)}}{1-n} + \frac{(n+1)\sqrt{2(n+1)}}{2(3-n)(n+2)} \lambda - \frac{(n+1)(n^2+4n+7)\sqrt{2(n+1)}}{8(5-n)(n+3)(n+2)^2} \lambda^2 + \frac{(n+1)(n^4+9n^3+39n^2+75n+60)\sqrt{2(n+1)}}{16(7-n)(n+2)^3(n+3)(n+4)} \lambda^3 - \frac{(n+1)(5n^7+90n^6+775n^5+3840n^4+11523n^3+20898n^2+21201n+9444)\sqrt{2(n+1)}}{128(9-n)(n+2)^4(n+4)(n+3)^2(n+5)} \lambda^4,$$

where n and λ denote the reaction exponent and Langmuir-Hinshelwood parameter, respectively. This result was derived as part of Iliyas Dossayev's Capstone Thesis in the Department of Mathematics at NU.

NU students served successfully as Research Assistants on all these projects. Their contributions are the best evidence that the NU has firmly established its research-oriented status through the model of interdisciplinary collaboration across schools and with research partners abroad (Chuvash State University in Russia, University of Wrocław in Poland, Otto von Guericke University of Magdeburg in Germany).

From Carbon Sequestration to Hydrogen Storage: Advancing Energy Solutions with AI



ID Shams Kalam Ph.D., Assistant Professor, School of Mining and Geosciences, Department of Petroleum Engineering

These papers were presented at an International Conference of the Society of Petroleum Engineers (SPE), Middle East Oil, Gas and Geosciences Show (MEOS GEO), held in Manama, Bahrain, September 2025.



RECENT PUBLICATIONS
Data-driven modeling to predict static contact angle in H₂/brine/mineral/cushion gas systems: Implications for underground H₂ storage.
Journal of Energy Storage.
<https://doi.org/10.1016/j.est.2025.118320>
(Top 10% Journal, Impact Factor: 9.8)

Diffusion-adsorption kinetics of anionic surfactants at a liquid-liquid interface: An analytical and experimental study.
Physics of Fluids, 37(9).
<https://doi.org/10.1063/5.0284817>
(Top 20% Journal, Impact Factor: 4.3)

Recent Research Highlights

1. APPLICATION OF MACHINE LEARNING FOR CO₂-ENHANCED COALBED METHANE PROCESS

A recent study introduces an **XGBoost machine learning** model that predicts the competitive adsorption of methane (CH₄) and carbon dioxide (CO₂) in coalbed methane (CBM) reservoirs, providing an alternative to time-consuming simulations and costly laboratory experiments. The model delivers highly accurate predictions while significantly reducing computation time, as shown in Figure 01. These findings demonstrate the **potential of machine learning to advance CO₂-Enhanced Coalbed Methane (CO₂-ECBM) strategies**, enabling more efficient methane recovery and effective carbon sequestration to lower environmental impact. [Link](#)

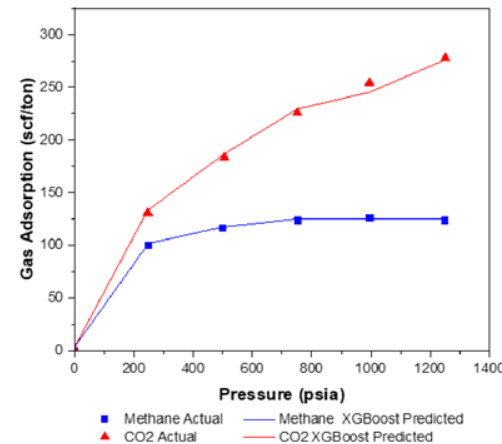


Figure 1: Adsorption equilibria in a binary system of methane and carbon dioxide (50% each).

2. APPLICATION OF MACHINE LEARNING FOR UNDERGROUND HYDROGEN STORAGE

Underground geological formations are emerging as a promising option for large-scale hydrogen storage, but the complex subsurface wettability behavior hinders their application. Traditional experimental techniques to study these interactions are both time-consuming and costly. Machine learning offers an efficient alternative, yet existing models fall short in capturing the complex mineralogical effects. This research introduces a **novel model for predicting wettability in Hydrogen-Brine-Mineral systems** under typical reservoir conditions, as shown in Figure 2. [Link](#)

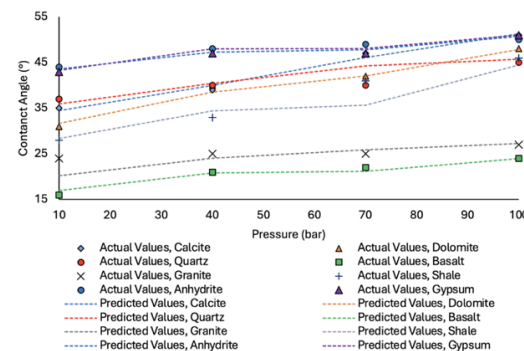


Figure 2: Comparison of experimental and XGBoost-predicted hydrogen/brine contact angles across different mineral types in distilled water at 40 °C

3. APPLICATION OF MACHINE LEARNING FOR CONFORMANCE CONTROL

Gel treatment is widely used to reduce water loss and block high-permeability zones in reservoirs, making rheological properties critical for long-term performance. This study applied **machine learning models (DT, SVR, GBR, XGBoost)** to predict the storage (G') and loss (G'') moduli of preformed particle gels (PPGs) using parameters such as temperature, salinity, frequency, particle size, shear strain, and PPG type. Among the models, **XGBoost outperformed others**, achieving R² values of 99.33% (G') and 98.53% (G''). A sample is shown in Figure 03. The predictive framework enables the formulation of tailored PPG formulations and the optimization of injection strategies, providing a robust tool for enhancing **water conformance control and oil recovery**. [Link](#)

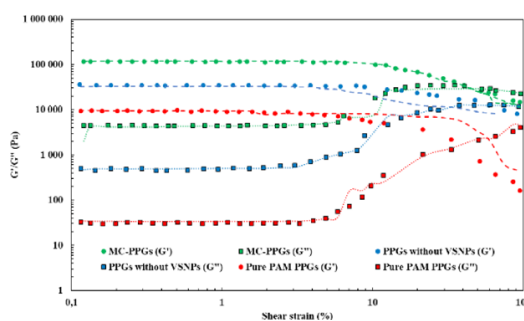


Figure 3: Effect of PPG type on G' and G'' (dots are experimental data points and colored dashed lines show the predicted trend based on XGBoost)

From Robotics to AI Platforms: CEMRR's Frontier Research in Rehabilitation, Oncology, and Orthopedics

Revolutionizing Medicine Through Innovation

cemrr.nu.edu.kz

CENTRE PROFILE

The **Center of Excellence in Medical Robotics & Research (CEMRR)** at Nazarbayev University stands at the forefront of Kazakhstan's technological transformation in healthcare. Under the leadership of **Dr. Prashant K. Jamwal**, the center integrates **robotics, artificial intelligence (AI), and biomedical engineering** to develop novel solutions that enhance diagnosis, rehabilitation, and surgical precision.

CEMRR RESEARCHERS:



Dr. Prashant K. Jamwal Associate Professor, Nazarbayev University Leads CEMRR research in medical robotics and AI for rehabilitation and surgery.



Dr. Aibek Niyetkaliyev Assistant Professor, Nazarbayev University Focuses on control systems, sensors, and intelligent robotics.

NATIONAL COLLABORATION:

- **Prof. Gani Balbaev**, Institute of Telecommunications and Space Engineering
- **Prof. Kassymbek Ozhikenov**, Satbayev University, Almaty
- **Prof. Sayat Ibrayev** Joldasbekov Institute of Mechanics and Engineering
- **Dr. Arman Batpenov**, National Scientific Center of Traumatology and Orthopaedy
- **Dr. Meiram Shakenov**, Center of Innovative Rehabilitation, Astana

CEMRR OBJECTIVES:

- **Innovative R&D:** Develop novel medical robots and AI solutions for disabilities and injuries.
- **Empowering Lives:** Enhance health, mobility, and independence.
- **Industry Impact:** Commercialize research for local and global medical advancements.
- **Collaborative Culture:** Foster interdisciplinary partnerships for progress.



Beyond research, CEMRR fosters an active academic community. The center hosts MEDTECH seminars, engages in joint projects with national hospitals, and co-organizes the International Conference on AI and Robotics (AIR 2025) with technical support from the Soft Computing Research Society (SCRS).

ADVANCING HEALTHCARE THROUGH ROBOTICS AND AI

CEMRR’s diverse research portfolio covers rehabilitation robotics, surgical robotics, and AI-driven diagnostics, each contributing to improving patient outcomes and healthcare accessibility in Kazakhstan and beyond.

Social Robot-Based Interventions for children with motor and cognitive disabilities. Engaging children in therapy through social robotics



In collaboration with the National Children’s Rehabilitation Centre, CEMRR researchers are conducting clinical trials with a socially assistive humanoid robot designed to support therapy for children with motor and cognitive disabilities. The social Robot helps young patients engage more actively during

rehabilitation sessions, improving motivation and therapy outcomes. The project integrates robotics, psychology, and physical therapy, aiming to create evidence-based robotic interventions for pediatric rehabilitation.

GAIT Robot: Exoskeleton for Cerebral Palsy Rehabilitation
Restoring movement, step by step



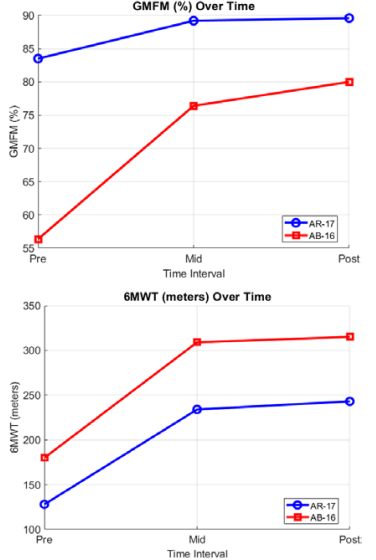
The **GAIT Robot project** focuses on creating a **lightweight exoskeleton** that helps stroke survivors and children with cerebral palsy regain mobility.

Combining precise mechanical control with adaptive feedback, the system provides consistent and measurable gait training. Currently undergoing refinement for clinical deployment, the GAIT Robot represents CEMRR’s commitment to making **robot-assisted rehabilitation accessible across Kazakhstan**.

Robotic Perturbation System for Balance Training
Helping patients improve their dynamic balance

CEMRR’s robotic perturbation system introduces subtle, controlled disturbances during standing or walking exercises. These mechanical “nudges” train patients to respond faster and stabilize more effectively improving balance and coordination during rehabilitation.

It enhances balance, stability, and motor coordination in patients, including those with Parkinson’s disease, stroke, cerebral palsy, spinal cord injuries, and other musculoskeletal or neurological disorders. The platform is currently undergoing clinical evaluation, showing promising results in restoring postural control and movement confidence in patients with limited mobility.

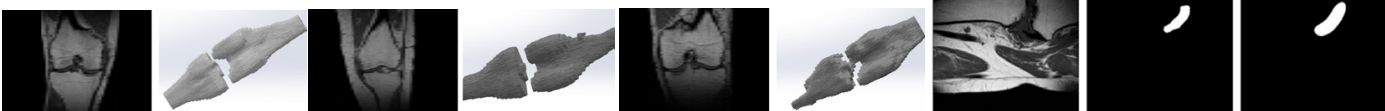


AI in Medical Imaging for Orthopaedics
Artificial intelligence for smarter diagnostics

ARTIFICIAL INTELLIGENCE IS TRANSFORMING MEDICAL IMAGING AT CEMRR
Researchers are developing AI models to detect pathologies in knee MRI scans and perform 3D reconstruction of bone and joint structures.

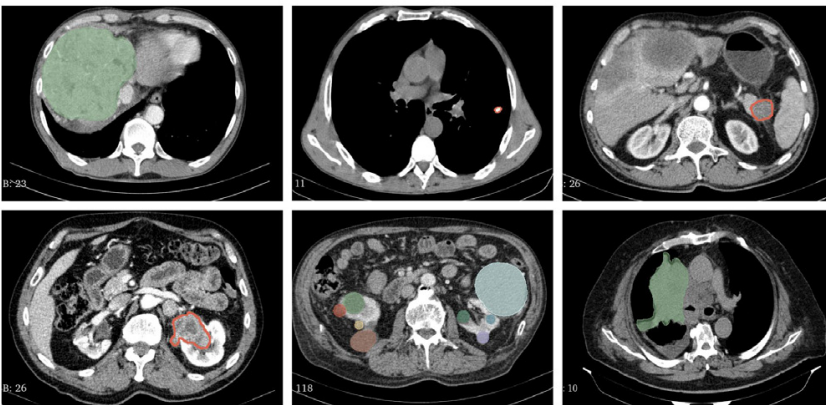
In recent experiments, the team achieved a high accuracy rate in detecting anterior cruciate ligament (ACL) tears, demonstrating the strong clinical potential of the system. Beyond diagnostics, the developed pipeline enables the generation of ready-to-print 3D bone models directly from MRI data. These tools assist surgeons in surgical planning, allowing for more accurate diagnosis, safer procedures, and faster recovery for patients. The project is being carried out in collaboration with the Scientific Research Institute of Traumatology and Orthopaedy named after Batpenov and Almaty City Hospital №4.

In the near future, CEMRR plans to integrate the AI diagnostic system into clinical workflows, enabling radiologists and orthopedic surgeons to apply automated analysis directly in patient care.



AI for Oncology Imaging
Bridging radiology and language through multimodal datasets

In collaboration with the National Research Oncology Center and Nazarbayev University, CEMRR researchers have developed MAGIC-CT, a large-scale multimodal dataset for AI-assisted cancer diagnostics. Comprising 562 contrast-enhanced CT scans and over 4,900 multilingual radiology reports (English, Russian, Kazakh), the dataset covers liver, kidney, lung, and pancreatic cancers. Publicly available on Hugging Face, MAGIC-CT sets a new benchmark for AI-powered oncology research and supports the development of tools for automated reporting, lesion tracking, and precision therapy.



Negative Rates and Optimal Inflation: A Conversation with Julio Dávila on Modern Monetary Theory

INTERVIEW with Julio DAVILA MURO, PhD

RESEARCHER PROFILE



Julio Dávila has held positions at the Universitat Autònoma de Barcelona, the Centre National de la Recherche Scientifique-Université Paris 1, the University of Pennsylvania, and the Center for Operations Research and Econometrics-Université de Louvain, before joining Nazarbayev University.

He has also been a visiting scholar at Harvard University, visiting professor at the Solvay Brussels School of Economics and Management and at the Universidad Carlos III de Madrid, and has made research visits to numerous institutions like National University of Singapore, University of California-Davis, Kyoto University, Queen Mary University, ... among others.

Professor Dávila has published his research on economic theory, macroeconomics, monetary policy, game theory, public economics and other fields in top and top field journals like Econometrica, the Journal of Population Economics, the Journal of Financial Stability, the Journal of Economic Theory, the Journal of Mathematical Economics, Economic Theory, the Journal of Macroeconomics, among others.

Can you briefly describe your research focus?

As my publications show, I have been and still am interested in many and very varied problems.

Most recently I have been addressing, along with a co-author currently at the Central Bank of Ireland, questions like how come we've seen negative nominal interest rates in 2014-2022? After all, if you are paid for borrowing, wouldn't you borrow without limit, borrowing even more to pay back previous loans while being paid in the process? Recent events in monetary policy raise interesting questions that push to the limit the conceptual framework that we use to think about the economy.

Currently, I'm interested in explaining inflation targets. Indeed, the US Federal Reserve, the European Central bank, the Bank of Japan... agree on inflation targets of 2%. The National Bank of Kazakhstan aims at 5% instead. Why these numbers? Where do they come from? It turns out that, maybe to the surprise of many they do not come from any sophisticated calculations, but rather from simple, back of the envelope reasonings that go as follows: let's aim at a value that is low enough for a minimum of price stability, but still sufficiently away from zero to avoid risking deflation, and moreover leaving a margin to stimulate the economy lowering rates if needed. That's it. This is disarmingly unscientific. It rightly prompts the question of what can we say about whether there exists even an optimal inflation target for an economy, and if yes what would its value be and what it would depend on.

The methods for this kind of research are both analytical and empirical. The working of an economy is the result of the actions taken by thousands of firms, millions of households, numerous regulatory bodies, and different governments whose decisions are all amenable to formal analysis, mathematically. For the sake of ending up with a manageable conceptual framework or model, assumptions need to be made that can be informed by, and tested against, empirical observations. Similarly, models generate implications about what we should observe, if they captured reality correctly, and therefore we can check whether what the model implies can actually be seen in the data.

Key results addressing these questions are: Ultra-low nominal rates, even negative ones actually play a role in achieving an efficient allocation of resources. Specifically, for the best possible steady state allocation to be implemented, loans from banks to firms need to have ultralow rates (zero rates in the limit), while loans from the central bank to banks need to have negative rates, in what effectively constitutes a steady injection of credit in the economy to sustain the best steady state.

Interestingly enough, under this light, the observed secular trend showing nominal rates declining steadily since at least the 13th century and converging from double digits to values close to zero, appears as a natural consequence of the continuous development of an increasingly sophisticated financial system that has helped improving the efficiency of the allocation of resources, and hence the prosperity of societies.

Implementing the best possible steady state requires not only the right policy rates already mentioned, but also that firms' leverage, i.e. their capacity to borrow, is somewhat bounded, which coincides with calls made during the big financial crisis of 2008 for the rates policy to be complemented with bounds to leverage as means to prevent bubbles.

Why is this research important?

Central banks are key players in the working of an economy. What they do, or don't do, has a huge impact on the working of markets, and hence on the profitability of firms, on the labor income of the workers they employ or lay off, and ultimately on the well-being of the households the latter sustain. A case in point is how the very poorly designed reaction of the US Federal Reserve to the 1929 Wall Street stock market crash turned a purely financial crisis into a huge depression that played an important part in plunging the whole world into an unprecedented war ten years later in 1939. From this perspective, having a sound understanding of what an optimal monetary policy would look like is of paramount importance, the prosperity and stability of societies hinges on it, as the 1930's experience shows.

What is the most exciting part of your work?

Some questions are suggested by the conceptual frameworks we use to think about the economy, some other are prompted by what we observe, and some by the mismatch between the two. For instance, until recently the possibility of negative nominal rates was dismissed as an absurdity not worth being even considered... then we saw them happening for the first time ever. When your models and reality disagree, it's surely not reality who is wrong.

The challenge in cases like this one is then that essentially you have to go back to basics to try and explain what the prevailing framework says shouldn't happen but happens, nonetheless. This is both overwhelming and fascinating, which is the fun part of doing this research. It is comforting though when you bump into something you were not looking for or did not expect, like the bounds to leverage as a means to ensure efficiency, and not just a means to prevent bubbles from building up. Independently reaching conclusions that had been suggested to address other issues only reinforces the impression that you are going in the right direction.

What challenges have you faced during the research?

Research requires time and resources, quiet time I would add. The more you devote of each to research the higher the likelihood of a breakthrough (there is never a guarantee; research, especially fundamental research, is always a risky endeavor). As a consequence, the challenge is always to be able to free enough time from other tasks in order to reach a critical mass of thinking time (there is a lot of inertia for our minds to get into, and also out of, a problem that makes distractions terribly disrupting, and therefore wasteful). Simultaneously, funds allow to hire Research Assistants, present results in conferences, visit colleagues with which discussions can be fruitful (no zoom session will ever match the productivity of lengthy face to face interactions), therefore it is always a challenge when one sees grant funds for RA's, conferences, visits... not being extended, or one sees grant applications inefficiently managed, or one sees standard practices at the best universities not being followed (like, for instance, the use of grant money for journal submission fees). These and other problems are hurdles that bog down research output.

tions), therefore it is always a challenge when one sees grant funds for RA's, conferences, visits... not being extended, or one sees grant applications inefficiently managed, or one sees standard practices at the best universities not being followed (like, for instance, the use of grant money for journal submission fees). These and other problems are hurdles that bog down research output.

What's next for your project?

Currently I am focused on the question of what would an optimal inflation target be, if there is one, and what would that target depend on. Preliminary results point to the fact that, actually, any target can be optimal, depending (among other things) on the accompanying policy rate, which somehow undermines the fixation on magic numbers like 2% and clarifies that different targets might be optimal for different economies.

Interestingly, in the process, I am identifying the source of sustained inflation, i.e. the force driving the secular trend for the average level of prices to slowly but steadily increase. Preliminary conclusions point to missing credit markets to be at the source of this phenomenon. This is important, since it gives us a direction towards we should move in order to improve price stability, which would be an important contribution to the well-being of society.

How do you maintain your research program and engage with the academic community?

I continuously submit to the best conferences in the profession drafts of the papers in progress to gather feedback on the ideas and results from colleagues, and whenever I have the funds I open RA positions in order to not only recruit help to make progress in my research but also, most importantly, to train future researchers while doing so. I hope to obtain new grant funds in the current calls to replace previous grants, so that I can continue funding RAs, presenting results at conferences, and visiting and inviting colleagues to collaborate with.



Prof. Julio Dávila:

"The good thing about research in economics is that it can be carried out anywhere, even on the go, you just need your brain, a good laptop and good connectivity. The timeline to get results crucially depends on, as I mentioned, the amount on time and funds devoted to this research: the more of any, the sooner and better results, this is a no-brainer."



Contact Information

Email:
julio.davila@nu.edu.kz

Website:
<https://sites.google.com/site/juliodavilaedu>

Office: 8.231,
Department of
Economics, NU

Toward Next-Generation Functional Materials



Professor Nurxat Nuraje's scientific vision extends far beyond the study of nanodiamonds. His Computational Engineering and Materials Science team integrates computation, chemistry, and engineering to create a toolbox for designing next-generation functional materials that address urgent global challenges in clean energy, sustainability, and health.

Key Research Directions

Hydrogen Production and Storage

Development of advanced catalysts, porous frameworks, and nanostructures to improve hydrogen generation, storage, and sensing.

Biomass Conversion

Transformation of renewable biomass into high-value chemicals and fuels, guided by AI-driven modeling to optimize catalytic pathways and reduce industrial costs.

Smart Polymers and Membranes

Engineering of nanostructured conducting polymers and responsive membranes for sensing, separation, and energy devices.

Functional Coatings and Nanomaterials

Surface modification strategies to create durable, anti-icing, hydrophobic, and environmentally resilient coatings.

Hydrogen for a Sustainable Future

NU researchers boost solar hydrogen production with photon up conversion

A team from Renewable Energy Lab has demonstrated a breakthrough in photoelectrochemical (PEC) water splitting, achieving a 56% improvement in photocurrent density by coupling cuprous oxide (Cu_2O) photocathodes with a triplet-triplet annihilation (TTA) up conversion device.

Proposed research

1. Enhancing Photocatalytic Hydrogen Production
2. Developing Solar-Sensitive Nanocomposites for Sensors
3. Photocatalytic Degradation of Organic Pollutants
4. Prototype Photovoltaics-Energy Storage Systems

Why Hydrogen Matters

Hydrogen is often called the fuel of the future. It can be produced directly from water using sunlight, without carbon emissions. Yet today, the solar-to-hydrogen (STH) efficiency remains at only ~3%, while at least 10% is needed for practical use.

Cu_2O in the Spotlight

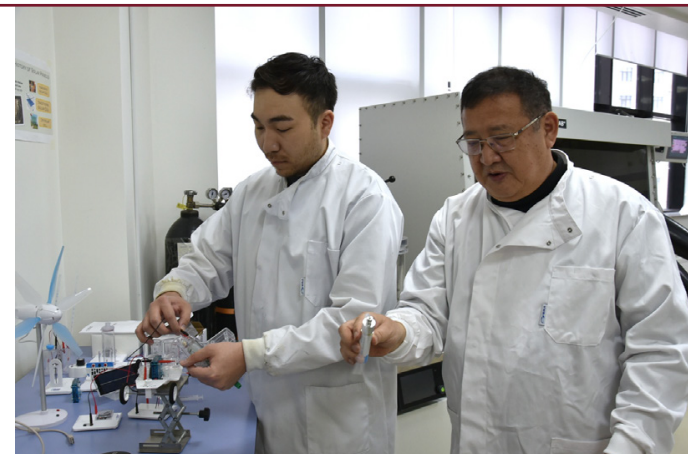
Among the candidate materials, cuprous oxide (Cu_2O) stands out. It offers:

- a suitable bandgap for photocatalysis,
- low-cost and scalable processing,
- a theoretical potential of up to 18% STH efficiency.

Innovative Strategies

Researchers are addressing these challenges with:

- protective layers and co-catalysts to improve durability,



- heterojunctions to enhance charge separation,
- upconversion materials to capture more of the solar spectrum,
- tandem device designs that combine Cu_2O with photoanodes or PV cells.

Outlook

Recent tandem cells with Cu_2O photocathodes have achieved 4.55% STH efficiency, a step forward but still below the target. Future progress depends on optimizing charge transport, reactor design, and cost-effective stability solutions.

RESEARCH TEAM

Dr. Yerbolat Magazov – PhD, Chemical Engineering, Group Leader
 Dr. Vladislav Kudryashov – PhD, Materials Science, KazNU
 Dr. Yerkin Shabdan – PhD, KazNU
 Dr. Nurlan Almasov – PhD, KazNU
 Aliya Kurbanova – PhD student, photocatalytic materials
 Assel Rakymbekova – PhD fellow, photoelectrodes
 Zhamilya Taubaldiyeva – MSc student, solar PEC
 Asset Aliyev & Yerniyaz Zhangaliyev – BSc researchers

Hydrogen Storage Group — Solid-State Solutions for a Clean Energy Future

As the world transitions to sustainable energy sources, hydrogen is increasingly seen as one of the key energy carriers of the future. However, its widespread use depends directly on how efficiently and safely humanity can store this gas. This is the challenge being addressed by the Hydrogen Storage Group at the Renewable Energy Laboratory of NU.

Next-Generation Materials

Research is focused on two major approaches — **physical and chemical hydrogen storage**.

- Physical storage relies on porous materials such as metal-organic frameworks (MOFs) and covalent-organic frameworks (COFs). Their unique structures with extremely high surface areas allow them to adsorb large amounts of hydrogen.

Despite these advantages, MOFs and COFs remain sensitive to humidity and solvent exposure, requiring further engineering improvements.

- Chemical storage involves metal hydrides and complex hydrides, which form strong chemical bonds with hydrogen. These materials provide high storage capacities, stable cycling, and fast kinetics, making them promising for both mobile and stationary applications.

At the Research Frontier

The group employs a wide range of advanced characterization techniques, including X-ray diffraction (XRD), Raman spectroscopy, scanning and transmission electron microscopy (SEM and TEM), and X-ray photoelectron spectroscopy (XPS).

Two particularly important methods are:

- BET analysis, which measures surface area and pore size distribution;
- High-Pressure Volumetric Analyzer (HPVA), which evaluates gas storage capacities under different conditions.

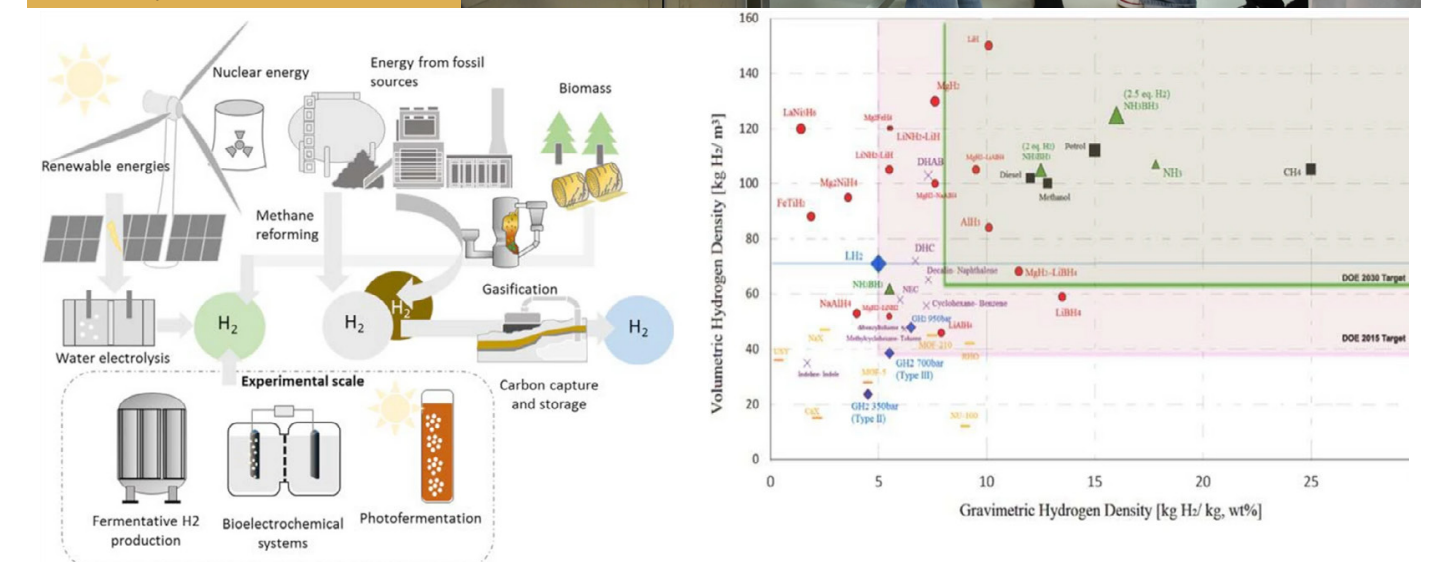
These tools allow researchers to deeply study storage mechanisms and identify ways to enhance efficiency.

Challenges and Perspectives

The main challenges in hydrogen storage lie in reducing material costs, scaling up production, and ensuring long-term stability. Current research is directed at developing nanostructured materials and introducing catalytic functions to accelerate adsorption-desorption processes and improve durability.

RESEARCH TEAM

- Dr. Aitkazy Kaisha – Senior Researcher, PhD – Group Leader
- Dr. Tileuberdi Nurbol – PhD in Petroleum Engineering
- Madina Kalibek – Hydrogen storage in Ti-based alloys, activated carbons & composites.
- Botakoz Suleimenova – MOFs, polymers, and composites for hydrogen storage.
- Azat Mahmet – MOFs and carbon-based materials for storage, multidisciplinary chemistry & engineering.
- Aigerim Ospanova – MOFs, hydrides, and electrospinning techniques.
- Talgat Orazbek – Porous materials & MOFs, BET & adsorption studies.
- Raushan Soltan – Carbon materials, material science.
- Ayakoz Bakytbek – Hydrogen storage, MOFs, hydrides.



Schematization of technologies available for hydrogen production, DOE target areas for hydrogen storage technologies: volumetric and gravimetric density specifications. DOI: 10.1186/s11671-024-04137-y

Biomass conversion into value-added products

Turning Waste into Opportunity

The global decline of fossil fuel reserves and the pressing need to mitigate their environmental impact have sparked the search for sustainable alternatives. One of the most promising solutions is the conversion of waste biomass into value-added materials for applications ranging from pharmaceuticals and cosmetics to polymers and food packaging.

From Biomass to Platform Chemicals

Our research focuses on developing efficient pathways to transform biomass-derived molecules, such as furanics, particularly furfural, and 5-hydroxymethylfurfural (5-HMF), into active pharmaceutical ingredients (APIs), commodity chemicals, and bio-based polymers. These compounds are considered platform chemicals building blocks that can unlock a variety of industrial applications. The central challenge lies in scaling production efficiently and cost-

effectively. To address this, we explore advanced catalytic methods, including the use of Lewis and Brønsted acids (e.g., HCl, AlCl₃, and H₂SO₄), under carefully optimized conditions.

Why It Matters

This research underscores the potential of photo-, mechano-, and flow-chemistry approaches to accelerate biomass conversion while reducing reliance on fossil fuels. The results demonstrate that selecting optimal conditions temperature, reaction time, catalyst, and solvent system is crucial for achieving high yields from diverse feedstocks. By transforming agricultural waste into platform chemicals, our work contributes to a circular economy, reduces environmental waste, and opens avenues for producing sustainable medicines, polymers, and industrial materials. Ultimately, these advances highlight how chemistry can power a greener and more resource-efficient future.

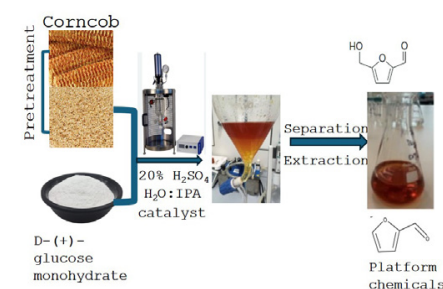


Figure 1. Process flowsheet of 5-HMF and furfural production from glucose and corncob respectively

RESEARCH TEAM

- Dr. Minavar Shaimardan – Senior Researcher, Group Leader
- Harry Kwaku Megbenu – PhD Student, NU
- Makpal Rakhatkyzy – PhD Student, NU
- Zhanat Azhikhanova – PhD Student, ENU
- Gertrude Ellen Fynn – PhD, NU
- Kyran Kassym – Research Assistant

[Read the article](#)



RESEARCH EQUIPMENT

Vapourtec R-4 Continuous Flow Reactor

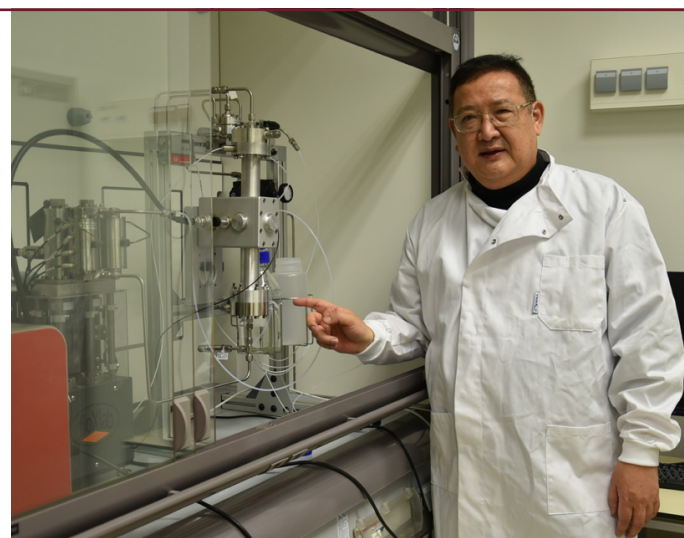
The Vapourtec R4 continuous flow platform, equipped with Hastelloy coil reactors, packed bed column reactors, and photochemical reactors, supports versatile continuous flow chemistry under both homogeneous and heterogeneous conditions. It enables multistep reaction sequences for process development and optimization studies, with integrated in-situ monitoring and real-time reaction analysis.

MO-Flow Benchtop Reactor

The MO-benchtop reactor from OU Shisheng Company Limited operates exclusively in continuous flow mode, offering precise control over reaction conditions for a wide range of chemical processes.

Microwave Flow System

The microwave flow reactor from Sairem and FloxLab, enables both continuous flow and batch processing under microwave conditions for rapid, efficient, and scalable chemical synthesis.



Smart Polymers & Membranes

Zwitterionic polymers, carrying both positive and negative charges, are at the core of our research. They are valued for their biocompatibility, antifouling ability, and stimuli-responsive properties, which make them suitable for both industrial and biomedical applications.

Research focus

- **Synthesis:** Hydrophobically modified zwitterionic polymers for biofouling/scale-corrosion inhibition, developed and screened on microfluidic platforms, and AI modeling.
- **Membrane filtration:** Next-generation zwitterionic polymer membranes for advanced water treatment, water reuse, desalination, and industrial separations.
- **Biomedical:** Self-healing zwitterionic hydrogels, and nanoparticles for controlled drug delivery, wound care, and tissue regeneration.
- **Sensors:** Electropolymerized quantum-dot interfaces to fabricate electrochemical sensors for ambient air-quality monitoring.

The challenge of wax deposition

In petroleum production, wax deposition is a major issue that reduces flow rates and can block pipelines. This occurs when crude oil cools below the wax appearance temperature (WAT). Measuring WAT in the laboratory is often time-consuming, costly, and prone to errors, while reliable predictive models are scarce.

Impact targeting

- More safe water per unit energy
- Longer membrane lifetime with fewer cleanings
- Practical desalination and reuse for Kazakhstani communities

Why It Matters

Together, these two research streams smart polymers and smart modeling illustrate the power of cross-disciplinary innovation:

- Enabling clean water technologies and antifouling membranes,
- Developing regenerative biomaterials,
- Ensuring energy security through reliable pipeline operations.



Dr. Munziya Abutalip: "By swapping just one ring or linkage, we can 'dial in' how these polymers handle heat and how they assemble exactly what membranes and medical hydrogels need."

SELECTED PUBLICATIONS

RAFT Polymerization of Amphiphilic Polycarboxybetaines and Their Molecular Interactions, *Langmuir*, 2019, 35, 8389–8397. <https://doi.org/10.1021/acs.langmuir.9b01347>

Hydrophobically Modified Polycarboxybetaine: From Living Radical Polymerization to Self-Assembly, *Langmuir*, 2019, 35, 1606–1612. <https://doi.org/10.1021/acs.langmuir.8b03561>

Preparation of Zwitterionic Sulfobetaines and Study of Their Thermal Properties and Nanostructured Self-Assembling Features, *Nanomaterials*, 2025, 15(1), 58. <https://doi.org/10.3390/nano15010058>

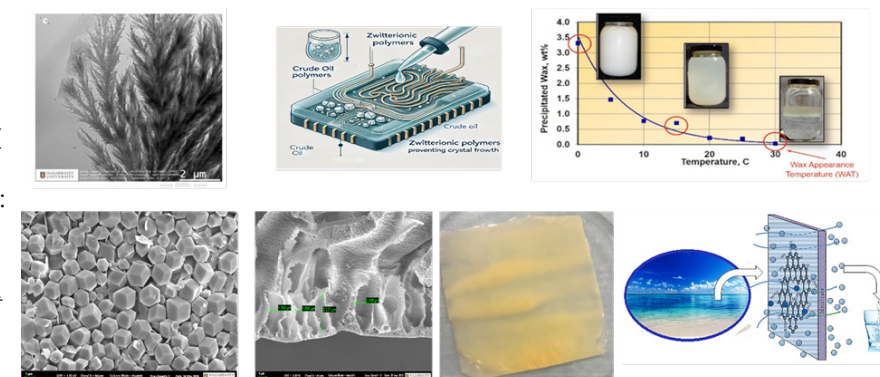
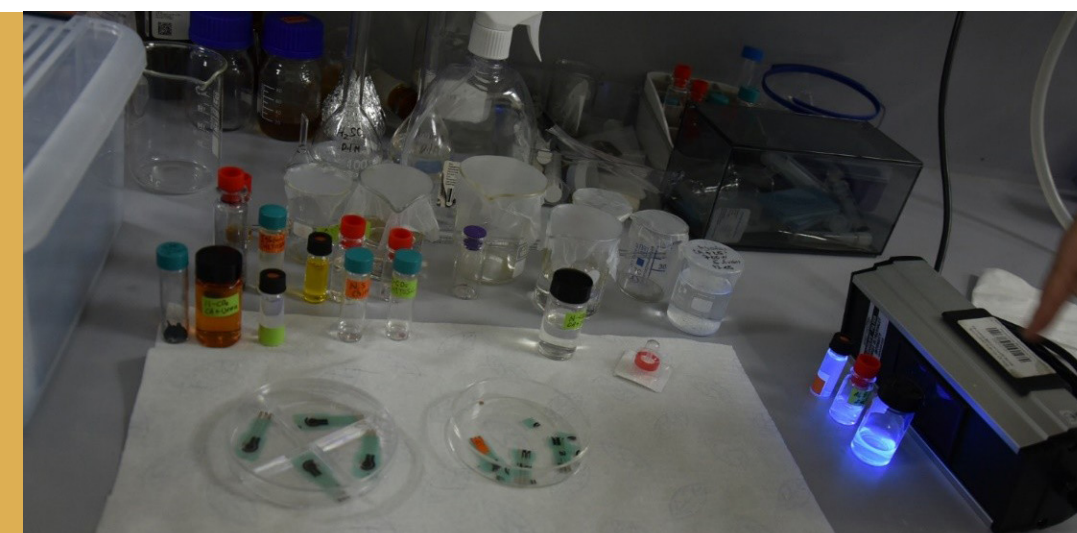


Figure TEM images of polymers pSBMAM and pSB2VP. (a,d) pH = 4, (b,e) pH = 8, and (c,f) pH = 12.

RESEARCH TEAM

- Dr. Munziya Abutalip – Leading Researcher, Group Leader
- Arshyn Zhengis – PhD Student, Al-Farabi Kazakh National University
- Yenglik Amrenova – PhD Student, Satbayev University
- Yernar Kanagat – PhD Student, L.N. Gumilyov Eurasian National University
- Araitlym Yergesheva – MSc Student, Nazarbayev University



Computational Engineering with AI Acceleration

Among the recent highlights of Prof. Nuraje's work is the structural, surface, and theoretical investigation of hydrophobic-modified nanodiamond (ND) powders, published in Scientific Reports (2025) by his team and collaborators.

Among the recent highlights is the team's **AI-assisted structural and surface investigation of nanodiamond powders**, published in Scientific Reports (2025). Nanodiamonds are carbon crystals less than 100 nm in size, with exceptional hardness, biocompatibility, and optical properties. Their natural tendency to agglomerate has long limited applications, but thanks to AI-guided modeling of surface modifications, the team is able to identify promising functionalization strategies far more quickly than by conventional trial-and-error methods.

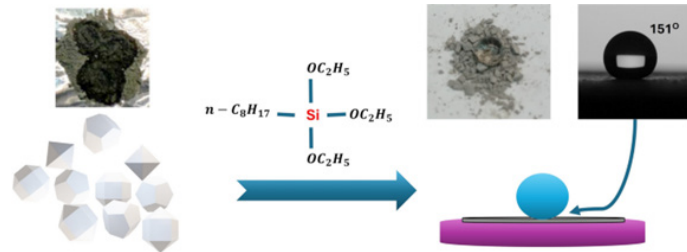
Prof. Nuraje's group successfully modified nanodiamonds with triethoxy (octyl) silane (TREOS), creating particles that exhibit superhydrophobic behavior with a striking water contact angle of 151°. Advanced characterization techniques Raman spectroscopy, X-ray diffraction, SEM imaging, FTIR spectroscopy, and contact angle measurements confirmed both the structural integrity of the diamond core and the efficiency of the silane grafting process.

The results demonstrated stable Si–O–C and Si–O–Si linkages, a reduction in particle agglomeration, and excellent dispersion in nonpolar solvents. These advances pave the way for **new applications** in:

- Waterproof and self-cleaning coatings
- Anti-corrosion and anti-icing surfaces
- Lubrication and anti-wear technologies
- Biomedical devices and high-performance nanocomposites

RESEARCH TEAM

- Dr. Mirat Karibayev – Senior Researcher, Group Leader (Chemical Engineering, Materials Science)
- Beksultan Akilbekov – Research Assistant (Chemical Engineering)
- Ayaulym Amankeldiyeva – Researcher (Chemical & Materials Engineering, Chemistry)



Water contact angle (WCA) measurements of the modified NDs.
<https://doi.org/10.1038/s41598-025-10027-9>

Looking Ahead

Computational engineering provides a powerful lens to understand and design materials with unique functionalities. Future studies will extend to new copolymer systems, humidity-dependent simulations, and time-dependent DFT analyses to evaluate optical sensing properties. These efforts aim to develop sensors and coatings that are not only highly efficient but also robust for real-world environmental and industrial conditions. Through this synergy of theory, modeling, and experiment, the team is shaping a future where computational design accelerates breakthroughs in sustainable energy, smart sensing, and advanced materials.

Nanostructured Conducting Polymers for Flexible Energy Storage

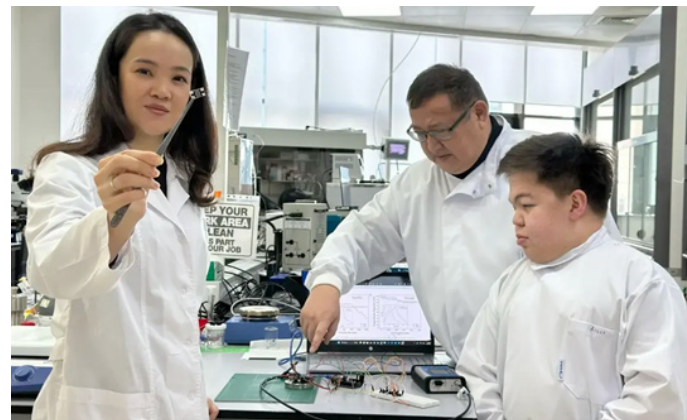
Nanostructured conducting polymers polypyrrole (PPy), polyaniline (PANI), polythiophene (PTh), and PEDOT combine the mechanical flexibility of plastics with the electrical properties of metals and semiconductors. Their unique characteristics make them ideal candidates for flexible electronics, wearable sensors, and advanced energy storage systems.

At the Renewable Energy Lab (REL, NLA), researchers investigate the reproducible synthesis of conducting polymer nanostructures, spanning from zero-dimensional nanoparticles to complex 3D composites. One of the lab's central goals is to overcome challenges in hydrogen gas detection and energy storage, which are pivotal for the clean energy transition.

Breakthrough: Template-Free Porous Hybrid Polymers

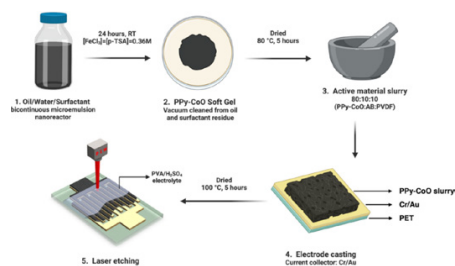
A recent landmark study, published in Scientific Reports (Sci Rep 15, 9577 (2025), Springer Nature), introduced a world-first template-free bicontinuous microemulsion (BME) polymerization method for fabricating porous hybrid conducting polymers (HCPs). This pioneering research, led by Prof. Nurxat Nuraje and driven by Dr. Guldana Zhigerbayeva as part of her PhD project, successfully produced 3D porous polypyrrole–cobalt oxide (PPy–CoO) nanocomposites. Unlike traditional methods that rely on rigid templates, the BME approach creates open-cell porous structures with superior functionality and scalability.

The study has already attracted attention across multiple media platforms, highlighting the international significance of NU's contribution to flexible energy storage and wearable electronics. **“Our vision is to design functional materials that not only solve today's energy challenges but also anticipate tomorrow's applications,” – Prof. Nuraje**



RESEARCH TEAM:

- Dr. Dana Kanzhigitova – Researcher, Group Leader
- Dr. Guldana Zhigerbayeva – Researcher
- Perizat Askar – PhD Student, Nazarbayev University
- Sagydat Duisenbekov – PhD Student, Nazarbayev University
- Alina Tilekkabylova – MSc Student, Nazarbayev University



The schematic illustration of PPy-CoO-based micro-pseudocapacitor fabrication

Functional coatings

The **multi-functional nanocomposite materials group** is a subgroup of the Renewable Energy Laboratory in membrane technologies, and nanocomposites for multipurpose applications (oil-water separation, desulfurization, anti-icing/fogging). Superhydrophobic materials with self-cleaning properties, desulfurization, and oil-water separation capabilities, anti-fogging and anti-icing applications, and gecko-inspired materials all represent diverse innovations in the field of advanced materials

Enhancing Road Durability and Safety: Silica-Based Superhydrophobic Coating for Cement Surfaces

The formulation combining triethoxy(octyl)silane, nano-SiO₂, a coupling agent, epoxy resin and diethylenetriamine can be applied directly to cement and cured rapidly. The coated surface reaches a water contact angle (WCA) of 161°, and after a blade-scratch test retains 151°, demonstrating robust, persistent superhydrophobicity. Microscopy (SEM) and FTIR confirm a siloxane (Si–O–Si) network and hierarchical roughness that underpin the coating's water-shedding, self-cleaning behavior.

Key Findings

- **Rapid application:** ~45-minute solution prep; spray deposition and simple thermal activation.
- **Extreme water repellency:** WCA 161°; droplets bounce and roll off, limiting water ingress.
- **Mechanical robustness:** WCA 151° after blade scratching; coating remains functional.
- **Validated chemistry & morphology:** FTIR shows Si–O–Si; SEM reveals nano-scale texture.
- **Target uses:** Road pavements, roofs and exposed building materials in harsh climates.

Why it matters: Water infiltration drives rebar corrosion, freeze–thaw cracking and surface spalling in concrete pavements. A persistent superhydrophobic top layer reduces ingress and ice adhesion, improving safety and extending service life.

How it works: Nano-SiO₂ creates hierarchical roughness; silane chemistry forms a low-energy siloxane network. Together they sustain the Cassie–Baxter state responsible for extreme repellency even after abrasion.

RESEARCH TEAM

- Dr. Olzat Toktarbailu – Senior Researcher, Group Leader
- Dr. Zhaxenbek Toktarbay, Researcher
- Gulim Imekova – PhD Student, L.N., Gumilyov Eurasian National University
- Tolagay Duisabayev – PhD Student, Al-Farabi Kazakh National University
- Yerbolat Tezekbay – PhD Student, Al-Farabi Kazakh National University
- Muhammad Abdullah – PhD Student, Nazarbayev University
- Damir Karimov – PhD Student, Nazarbayev University
- Mergen Zhazitov – MSc Student, Nazarbayev University
- Aida Ardakkyzy – Research Assitant, Nazarbayev University

“A fast, sprayable route to durable superhydrophobicity on cement could help cities tackle freeze thaw damage, corrosion and icing without costly structural changes,” said Professor Nurxat.



Tunable Oil–Water Separation Using Engineered Cellulose Membranes

Industrial oil spills and oily wastewater pose serious threats to ecosystems and water security. Existing separation technologies often suffer from low efficiency, fouling, or high cost.

The authors emphasize that this approach is a highly promising solution for cleaning water from oil contamination, offering both speed and durability in real-world conditions.

The Solution

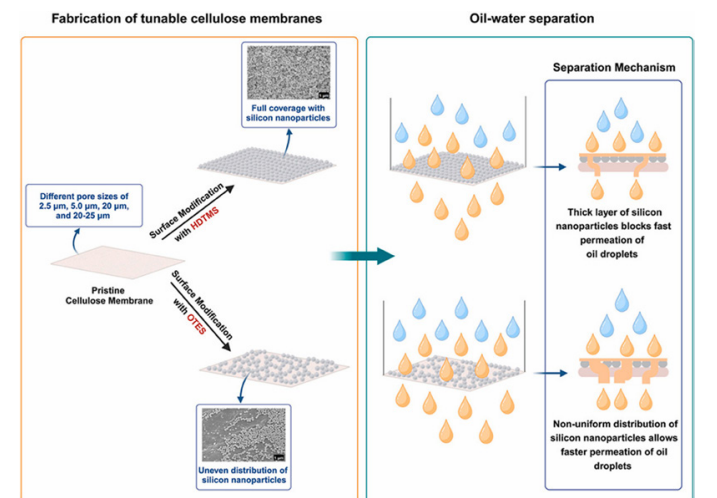
Researchers developed engineered cellulose membranes (CMs) modified with silane agents using a simple sol–gel dip-coating method. Despite cellulose being an inexpensive and common material, the modifications transformed it into a high-performance separation platform.

Key Findings

- Efficiency: OTES-modified membranes reached 96.1% separation with a flux of 14,088.7 L m^{−2} h^{−1}.
- Mechanism: Performance depends not just on hydrophobicity (WCA) but on nanoparticle distribution across the surface.
- Durability: Both HDTMS- and OTES-treated membranes showed fouling resistance and long-term stability.
- Design Insight:
 - HDTMS membranes – for stable long-term use.
 - OTES membranes – for rapid, high-throughput separation.

Why It Matters

This research challenges the belief that stronger hydrophobicity always ensures better performance. Instead, it demonstrates how surface nanostructure and porosity define separation outcomes. With scalable and low-cost fabrication, such membranes could revolutionize wastewater treatment, solvent recovery, and environmental remediation.



Graphical abstract

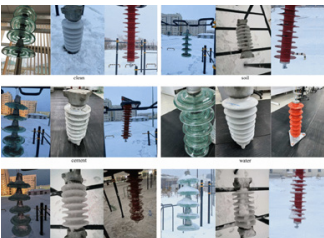
If you're interested in Professor Nurxat Nuraje's research projects and would like to connect, please visit the lab website for further information:
<https://nla.nu.edu.kz/relab>

IMPACT & METRICS
(SCOPUS):

Citations: 3489
h-index: 29



ID Mehdi Bagheri,
Assistant Professor,
School of Engineering
and Digital Sciences,
Department of
Electrical and
Computer Engineering



How Mehdi Bagheri’s Team is Shaping the Future of Urban Health and Energy

THE SPARK

Mehdi Bagheri: “At a university, our job is to develop the technology then license or transfer it so industry can scale. The knowledge is here, the patents are here. What we need is the last mile.” Professor **Mehdi Bagheri** leads research at Nazarbayev University’s School of Engineering and Digital Sciences that bridges **AI, smart systems, and energy infrastructure**. His team tackles two critical global challenges:

- **Air pollution:** developing smart city-wide air quality monitoring and forecasting systems.
- **Power grid reliability:** creating AI-assisted real-time inspection tools to prevent high-voltage insulator failures.

The second challenge became the foundation for **Arailym Serikbay’s PhD research**, which has produced new datasets, novel CNN classifiers, and systematic YOLO model selection techniques contributing benchmarks for the global AI and power engineering community.

The Problem: Silent Vulnerabilities in Power Grids

High-voltage (HV) insulators, often invisible to the public eye, are critical to the safe functioning of power grids. They must withstand extreme conditions:

- **Natural factors:** snow, ice, wind, soil dust.
- **Industrial impacts:** cement particles, pollution layers.
- **Sudden stresses:** flashovers, overvoltage, unexpected incidents.

Even a thin pollution layer on an insulator surface can behave like a conductive coating in humid or dry conditions, triggering insulator breakdown. This breakdown may lead to blackouts, costly repairs, or catastrophic failures. Traditionally, inspections have been manual and expensive, involving high-risk helicopter flights. Bagheri’s group saw an opportunity to replace these with UAV-based AI diagnostics: safer, faster, cheaper, and scalable.

Student Spotlight: Arailym Serikbay



Arailym notes: “Collecting clean and diverse unmanned vehicles images were as challenging as training the models. But the payoff was clear: a system that makes inspections faster and accessible in Kazakhstan’s unique climate.”

Arailym’s doctoral work pushes the boundaries of UAV-based inspection. Her research focuses on deep learning models for classifying defects and contamination on high-voltage insulator surfaces a critical issue for grid stability in Kazakhstan and beyond.

KEY CONTRIBUTIONS:

- Built a dataset of insulator surface images (ceramic, glass, silicon rubber) under contaminants such as snow, water spray, cement, and soil.

- Designed and trained CNN-based classifiers optimized through grid search, requiring 12x less memory than the best pre-trained models while maintaining high accuracy.
- Extended the work with YOLO-specific model selection, testing 13 architectures on 15,000 UAV-captured images to balance performance with computational efficiency.
- Proposed an “optimal” model (OP-YOLO), striking a practical trade-off for unmanned vehicles deployment in the field.
- These results are already benchmark references for future AI-driven power grid diagnostics.

Interview: Smart Monitoring for a Smarter Kazakhstan

Q1. Professor Bagheri, can you describe the focus of your lab’s work?

– Our research targets intelligent systems that pair aerial imaging with AI analysis. Unmanned vehicles make inspections faster and safer, while AI ensures early fault detection. Arailym’s PhD work is an excellent example of how we’re turning that vision into reality.

Q2. Why is this research important for Kazakhstan and globally?

– Our vast terrain makes helicopter inspections costly and dangerous. A UAV+AI solution doesn’t just see problems it classifies them in real time. That means lower risks, fewer outages, and more resilient power systems.

Q3. What challenges have you faced?

– The harder challenge is industry adoption. Companies expect plug-and-play solutions within months, but deep tech takes years. We need long-term investment and patience to reach full deployment.

Q4. What excites you most about the future?

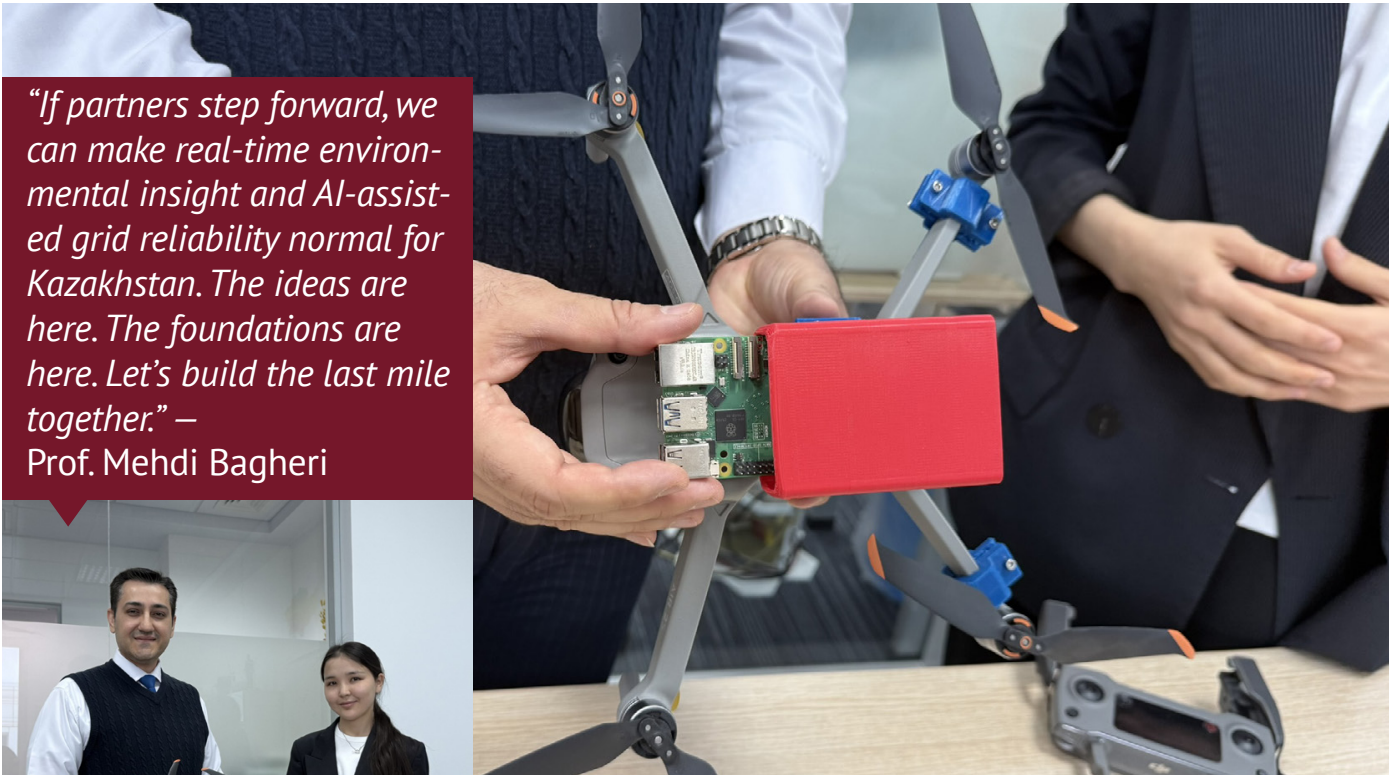
– Embedding AI directly on UAV processors edge-AI or tinyML is the future. Imagine a drone that flies, snaps an image, and instantly flags a broken insulator without sending data to the cloud.

WHY IT MATTERS

Electrical insulators are silent guardians of the grid, and their failure can cascade into costly blackouts. Mehdi Bagheri’s lab and Arailym Serikbay’s research show how UAVs and AI can transform inspections:

- Faster, safer and cheaper than traditional methods.
- Deployable on lightweight drones, even in remote areas.
- Extendable to solar panels, bridges, and industrial sites.

In parallel, Bagheri’s group is also advancing city-wide smart air quality monitoring, making the invisible visible through AI-driven mapping and forecasting. Together, these smart monitoring systems projects address both urban health and energy reliability two of Kazakhstan’s biggest challenges.



“If partners step forward, we can make real-time environmental insight and AI-assisted grid reliability normal for Kazakhstan. The ideas are here. The foundations are here. Let’s build the last mile together.” – Prof. Mehdi Bagheri

SELECTED PUBLICATIONS

A. Serikbay, M. Bagheri, A. Zollanvari and B. T. Phung.
Accurate Surface Condition Classification of High Voltage Insulators based on Deep Convolutional Neural Networks
IEEE Transactions on Dielectrics and Electrical Insulation,
doi: 10.1109/TDEI.2021.009648.

A. Serikbay, V. Nurmanova, Y. Akhmetov, A. Zollanvari, M. Bagheri.
A Systematic YOLO-Specific Model Selection for Mechanical Fault Identification in High-Voltage Insulators. International Transactions on Electrical Energy Systems.
<https://doi.org/10.1155/etep/8669289>

Research Support Hub by NU Library

Nazarbayev University Library is committed to supporting the research community at every stage of the research lifecycle from publishing opportunities to accessing global resources.



Learn More and Get Help

For additional guidance and resources, visit the NU Library website or contact NU librarians directly – www.library.nu.edu.kz. You can also visit the Library in Block 5 to ask questions in person and explore available research support services.



Undergraduate and graduate research avail of the Training & Consultations in group, in-person, on-site, online on the following:

- basics of research design
- developing search strategies
- selecting appropriate tools/databases for literature reviews and evidence synthesis
- citation management, data management
- strategies for staying current in your field
- navigating scholarly publishing
- bibliometrics
- AI literacy

The advanced research support service will help to succeed researchers and postgraduate students, providing:

- Consultations on research visibility (guidance on ORCID, Scopus Author ID, and Web of Science ResearcherID).
- Publication strategy advising (identifying suitable journals, understanding journal impact factor, and avoiding predatory publishers).
- Support in Understanding Institutional repository policies and copyright requirements
- Depositing your work in the institutional repository

Enhancing the visibility and research impact on a global scale

Repository Overview & Content Structure

Nazarbayev University repository website - nur.nu.edu.kz

The NUR serves as an institutional electronic archive—built on the DSpace platform—designed for long-term preservation, aggregation, and reliable open access to the scientific outputs and intellectual property generated by the Nazarbayev University community and affiliated organizations.

Established in 2015, it offers structured access through a variety of communities & collections, each with item counts:

Total number - 9216 items

- Theses: 2,797
Bachelor theses - 675
Master theses - 1913
In open access: 858
PhD theses - 209
In open access: 77
- NU Schools: 2,734
- NU Research Institutes & Centres: 1,073
- NU Publications: 1775
- Forums, conferences & projects: 126

Repository Presence & Cataloging

The repository is indexed in OpenDOAR, a global directory of academic repositories, confirming its institutional status and use of DSpace software. It supports a wide range of content types, including journal articles, conference papers, theses, reports, books, chapters, learning objects, and more.



Open access publishing agreements

The agreements allow NU-affiliated authors to publish in selected gold and hybrid open access journals, with APCs covered by NU.

NU has established open access publishing agreements with: Wiley

The Transformative Agreement between NU and Wiley has been active from April 1, 2024, and is extended in April 1, 2025 and valid through March 31, 2026. This agreement aims to support the open access publishing of research articles, allowing NU authors to publish without publication fees under NU requirements set and published in the [libguide](#) and via email.

The approved requests represent a broad range of disciplines. The articles published cover journals in fields such as energy, education, environmental science, philosophy, medical research, and others. Key details of some prominent approved publications include:

British Journal of Educational Technology – ranked in Top 1% journals indexed in Scopus

Energy & Environmental Materials – ranked in Top 2 % journals indexed in Scopus

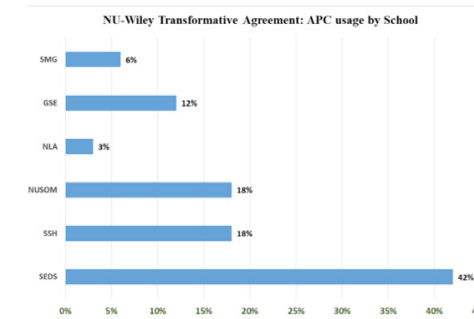
Mind & Language – ranked in Top 5 % journals indexed in Scopus

International Journal of Alzheimer's Disease – ranked in Top 5 % journals indexed in Scopus

Sedimentology – ranked in Top 5 % journals indexed in Scopus notifications to NU faculty and researchers.

Regarding the NU–Wiley Transformative Agreement, the majority of APC coverage is attributed to SEDS authors, followed by NUSOM and SSH, with additional contributions from GSE, SMG, and NLA. Consequently, all of these authors published their articles in open access, Q1-ranked journals.

In total, all approved requests are published or in the process of publication in open access. These articles contribute to the dissemination of high-impact research in a range of academic fields.



ACM – Association for Computing Machinery

Association for Computing Machinery is the world's largest computing society and a leading publisher of research in computer science and information technology. Through NU's transformative agreement with ACM, researchers can both access leading computer science research and publish their work openly.

The agreement has been signed in 2024 and still valid. There is 1 approved submission which is published in 2024 by SEDS professor. [Link](#)

Cambridge University Press

This agreement exists since 2021 and it is a "read and publish" agreement where NU acquires a whole package where funding is allocated partly for subscribed resources and partly for publishing services. NU authors also could publish using the university funding in high-quartile journals.

Oxford University Press

The agreement has been signed in June, 2025 and currently 1 submission has been approved for APC coverage.

Databases - Access to the worldwide research

Library provides access to the global research ensuring subscription to academic peer-review journals, research monographs, conference papers, theses, and other scholarly resources. The high quality credible information fosters collaboration, innovation, research connections across countries and institutions.

Reference databases - Web of Science, Scopus, Pivot, SciVal

Full text databases for interdisciplinary and subject research - [A-Z databases](#)

Interlibrary Loan

Interlibrary Loan (ILL) Document Delivery is one of the services provided by the Library through the Department to obtain resources that are not available by virtue of the partnership agreement or informal collaboration with other libraries.

Partnership agreements: University of Wisconsin–Madison, Library of Congress.

Delivery times vary depending on whether the document is owned by a Partner Institution or not.

Email library@nu.edu.kz with the full citation information of the source, or fill out the form.

Request form: https://nukz.asia.qualtrics.com/jfe/form/SV_3skawo60zFBZAnH

Libguides - Reliable research companion

The guidance in searching and locating the research materials, use of tools and basics of research processes:

- [Library Research Support Services](#)
- [Research Support Guide for NU undergraduates](#)
- [Research Support Guide for NU Staff and PhD students](#)
- [Nazarbayev University Repository](#)

• Open Access

• [Open Access Publishing Agreement: Oxford University Press](#)

• [Open Access Publishing Agreements: ACM](#)

• [Open Access Publishing Agreements: Cambridge University Press](#)

• [Open Access Publishing Agreements: Wiley](#)

• [Open Educational Resources](#)

• [Open Research](#)

• [Systematic review](#)

• [Evidence synthesis](#)

• [Literature review](#)

• [Scholarly communication and publishing](#)

• [Research Impact](#)

• [AI tools for research and study](#)

• [Annotated bibliography](#)

ISSAI Highlights: A Roundup of Key Developments

ISSAI Successfully Concludes Summer Research Program 2025 for High-School and University Students



On July 10, 2025, the Institute of Smart Systems and Artificial Intelligence (ISSAI) celebrated the successful completion of its five-week Summer Research Program (SRP) 2025 for high-school students. The program brought together 41 talented participants from leading schools across Kazakhstan, offering them an immersive, hands-on experience in artificial intelligence, programming, robotics, and cutting-edge research. Following the theoretical foundation, students selected their specialized tracks and worked under the guidance of ISSAI researchers on individual and group research projects. The projects covered diverse domains such as Robotics, DevOps, MLOps, Avatars, LLMs, and Speech-to-Text systems. [Read more](#)

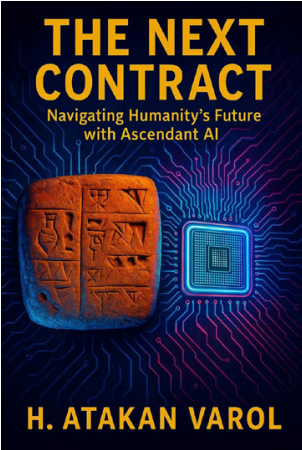


On July 31, 2025 ISSAI celebrated the successful completion of its 2025 Summer Research Program for the university students – a nine-week intensive research experience that brought together talented undergraduate students from Kazakhstan and abroad. This year's program was highly competitive, with a record 275 applications, and brought together participants from leading Kazakhstani and international universities. In total, 22 students successfully completed the program and received official certificates. [Read more](#)

The ISSAI SRP Participants: Nazarbayev University, Korkyt Ata Kyzylorda University, Kazakh-British Technical University, Astana IT University, Kazakhstan Branch of Moscow State University, Semey State University named after Shakarim, West Kazakhstan Agrarian and Technical University named after Zhanqir Khan, Suleyman Demirel University, and M. Kozybayev North Kazakhstan University. Several Kazakhstani students studying abroad joined while on summer break, representing KAIST and Yonsei University (South Korea), MBZUAI – Mohamed bin Zayed University of Artificial Intelligence and New York University Abu Dhabi (UAE). The program also welcomed international students from New Uzbekistan University (Uzbekistan), Al Akhawayn University in Ifrane (Morocco), and the National Research University – Higher School of Economics (Russia).

The ISSAI SRP continues to serve as a unique platform for nurturing the next generation of AI researchers and innovators in Kazakhstan. This summer, students were not just learners – they became contributors to real-world research, engaging with advanced tools and working on ideas that may shape the future of technology in the region.

ISSAI Founding Director, Dr. Atakan Varol, Presents His New Book, "The Next Contract," on Humanity's Future with Ascendant AI



H. ATAKAN VAROL

Dr. Atakan Varol, the founding director of ISSAI, has announced the publication of his new book, "The Next Contract: Navigating Humanity's Future with Ascendant AI." The book tackles one of the most pressing issues of our time: how humanity will co-exist with an artificial intelligence that could surpass human capabilities. Drawing on his extensive background in robotics, machine learning, and AI, Dr. Varol provides a comprehensive analysis of the trajectory of artificial intelligence, from its conceptual origins to the potential emergence of Artificial General Intelligence (AGI) and beyond. "The Next Contract" frames the relationship between humans and AI as a series of implicit and explicit agreements, similar to the societal contracts that have historically governed human cooperation. The book posits that as AI becomes more capable, humanity will need to negotiate a new form of coexistence, moving from a position of creators to partners, and potentially, to a species that must strategically manage its own succession. "The Next Contract: Navigating Humanity's Future with Ascendant AI" is positioned as a crucial read for policymakers, technologists, academics, and anyone concerned with the profound societal shifts that advanced AI will bring. It is available for purchase on [Amazon as an e-book and hardcover.](#)



ISSAI Unveils Kazakhstan's Next Generation of AI Technologies

On July 17, 2025 ISSAI during the press briefing titled "ISSAI Update" unveiled a new suite of artificial intelligence technologies designed, developed, and deployed entirely by Kazakhstani professionals. The systems presented during the event mark a significant leap in Kazakhstan's journey toward self-reliance, cultural alignment, and infrastructure independence for Artificial Intelligence.

Following the presentation of the KazLLM large language model in December 2024, ISSAI now introduces five breakthrough products that place Kazakhstan at the forefront of culturally grounded and linguistically inclusive AI:

Oylan 2.5 – Multilingual Multimodal AI Assistant with Additional Latin Script Support. Oylan 2.5 is ISSAI's powerful AI assistant capable of operating in Kazakh, Russian and English languages. The new version enables the users to interact with this model using the Latin script for Kazakh in addition to the Cyrillic script.

MangiSoz 2.0 – Speech Recognition, Synthesis and Translation Engine
A robust system for real-world speech processing, MangiSoz 2.0 provides: High-accuracy speech recognition and synthesis in Kazakh, Russian, English, Turkish, and Chinese; Natural-sounding text-to-speech, speech-to-text translation mode in male and female voices for these five languages.

TilSync – Real-Time Subtitling and Translation Tool. TilSync enables seamless communication across languages and platforms providing Live subtitling and audio translation with low latency. It integrates with video conferencing tools and streaming systems with translation between Kazakh, Russian, and English.

Beynele – Culturally-Tailored Multilingual Image Generator. A generative AI model trained to create culturally relevant visuals from Kazakh, English, and Russian prompts.

Mangitas 02 – Inference Server for Localized and Secure AI Deployment. Custom-built AI hardware for secure and localized model inference.

tilSync ISSAI Launches TilSync: Real-Time Transcription and Translation for Multilingual Events

On September 5, 2025 ISSAI unveiled TilSync, a groundbreaking desktop application that transcribes and translates live speech into subtitles in real time. Supporting Kazakh, Russian, and English, TilSync allows subtitles to appear directly over any open application, making it an invaluable tool for public events, academic lectures, conferences, and other multilingual settings. Key features of TilSync include:

- Live Speech-to-Text
- Automatic Translation
- Subtitles Displayed Over Any Application
- Supports Kazakh, Russian, and English
- Designed for Multilingual Events and Accessibility

The application is now available for download at <https://tilsync.nu.edu.kz/>, making it accessible for anyone wishing to explore its features at public events, lectures, or conferences.

On September 17, 2025 TilSync was introduced and demonstrated in action during the NU Annual Research Conference 2025 opened at Nazarbayev University. During keynote speeches, attendees in the conference hall witnessed live translation from English into Kazakh displayed directly on the screen, showcasing TilSync's capacity to make academic events more inclusive and accessible.

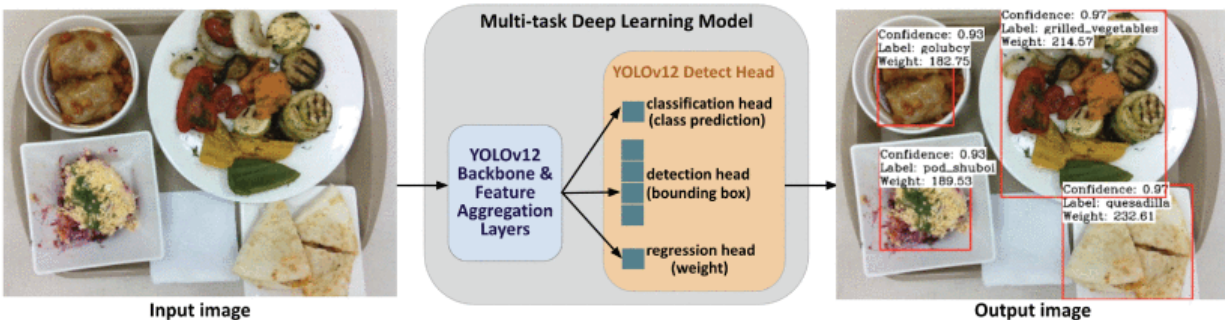
ISSAI Advances AI Research with New IEEE Access Publication

ISSAI and its team of data scientists continue to contribute to the advancement of global science and research. On August 27, 2025, their article "A Multitask Deep Learning Model for Food Scene Recognition and Portion Estimation—the Food Portion Benchmark (FPB) Dataset" was published in IEEE Access.

This work introduces an end-to-end multi-task method that combines food detection and portion size estimation within a single YOLOv12-based model. To support this, we present the Food Portion Benchmark (FPB) dataset – 14,083 images across 138 food classes with precise bounding boxes and laboratory-measured weights. A public [Food AI leaderboard](#) on Hugging Face, pre-

trained model weights, and generated annotations are also provided to ensure reproducibility and accessibility for the research community. Our model achieves state-of-the-art results: mAP50 of 0.978 for food detection and MAE of 90.95 grams for portion estimation. These findings demonstrate the potential of integrated approaches for accurate and scalable dietary analysis, especially for culturally relevant foods in Central Asia.

The article was co-authored by Aibota Sanatbyek, Tomiris Rakhimzhanova, Bibinur Nurmanova, Zhuldyz Omarova, Aidana Rakhmankulova, Rustem Orazbayev, Huseyin Atakan Varol, and Mei Yen Chan. ([Read more](#))





NU Library Highlights

Nazarbayev University Library Hosts the 39th IFLAPARL Satellite Meeting



On 23–24 August 2025, the Nazarbayev University Library proudly hosted the 39th Satellite Meeting of the IFLA Library and Research Services for Parliaments Section (IFLAPARL) in Astana, Kazakhstan, as part of the IFLA World Library and Information Congress (WLIC 2025).

This large-scale international gathering brought together over 70 participants from 30 countries, including parliamentary librarians, researchers, and information professionals from both Kazakhstan and abroad. Delegates represented parliaments and institutions from the United States, the United Kingdom, Canada, Greece, Angola, Belgium, Luxembourg, Kazakhstan, South Korea and many other nations, making the event a truly global platform for collaboration.

The overarching theme, “Fostering Collaboration and Innovation in Parliamentary Libraries and Research Services: Building Skills for a Connected Future”, emphasized the critical role libraries play in supporting democratic governance, informed policymaking, and global knowledge exchange.

The program featured plenary sessions, discussions on pressing topics, workshops, and presentations. Participants also joined informal networking opportunities and cultural activities.

Key themes highlighted during the meeting included:

- The role of libraries in supporting parliamentary research and decision-making
- Strengthening professional networks and sharing expertise within the global library community
- Integrating new technologies and digital services, including Artificial Intelligence for information analysis and enhancing library efficiency

The event reaffirmed the importance of libraries as centers of expertise, collaboration, and innovation. Its international scale also underscored Nazarbayev University’s role as a hub for dialogue and cooperation within the global library community.



“One of the things that I love about this conference is that it’s very collaborative. It’s very much about open sharing of experience and learning from each other, both formally and informally. I think both the format of the conference and the content can be very interesting for Kazakh librarians, whether academic, public, or special librarians like government or parliamentary librarians. Parliamentary librarianship in Kazakhstan is not yet as developed as in many other countries, but I hope that someday that might change and they will also be able to learn from these experienced colleagues.”

Ellie Valentine (USA), Librarian and International Development Specialist, Member of the IFLA Library and Research Services for Parliaments Section since 2003



Martin Reid
(United Kingdom), Incoming Secretary, IFLA Panel Committee

“This conference is really important for librarianship in Kazakhstan. As part of the broader IFLA World Library and Information Congress, it has been an incredible opportunity to bring librarians and professionals from around the world to Kazakhstan, to showcase the country’s strengths and this university as a centre of learning and professional practice. It’s brilliant to connect colleagues from Kazakhstan with colleagues from across the globe to share, understand, and learn from each other.”



Caroline Ménard
(Canada), Chair of the Library and Research Services for Parliaments Section (2023–2027), Head of Information Service at the Bibliothèque de l’Assemblée Nationale du Québec

“The importance of this conference for librarianship in general, and for our colleagues in Kazakhstan in particular, is, in my opinion, mainly focused on collaboration, skills, and the sharing of information that enables us to learn and grow together as a community. It is really about an exchange of knowledge and ideas that can be beneficial for both sides. We are very happy to be here, and we thank our colleagues from Nazarbayev University Library for welcoming us with such open arms.”

NU Librarians Represent Kazakhstan at IFLA 2025: Sharing Experience on the International Stage

Nazarbayev University Library proudly represented Kazakhstan at the IFLA 89th World Library and Information Congress held in Astana, where more than 140 countries were represented. NU librarians **Zhuldyz Orazymbetova, Head of Patron Services Office, and Yelizaveta Kamilova, Head of Library Research Support Office**, delivered their presentation “Designed to Impress: How Construction Challenges Impact Library Operations.”

RESEARCH-BASED INSIGHTS

The presentation was part of the **ENSULIB (Environment, Sustainability and Libraries Section)** open session “Buildings, Sustainability and Preservation”, under the theme “Research on the Effects of Sustainable Storage.”

DRAWING FROM NU LIBRARY’S OWN CASE STUDY, THE SPEAKERS HIGHLIGHTED:

- Impact of construction decisions on staff well-being, service efficiency, and the user experience.
- Methodology – staff surveys, analysis of operational and environmental conditions, and user experience evaluation.
- Ethical standards – the survey was reviewed and approved by the Nazarbayev University Institutional Research Ethics Committee (IREC).
- Practical outcomes – recommendations and strategies for overcoming current challenges and ensuring sustainable, future-ready library design.

INTERNATIONAL RECOGNITION AND COLLABORATION

The session attracted **significant interest** from global colleagues. NU’s case study was praised for its openness and practical value. Discussions extended beyond the session, with participants exchanging additional ideas and exploring opportunities for **future collaboration**.

By sharing their expertise, NU librarians strengthened Kazakhstan’s contribution to shaping international conversations on **sustainable library development and innovation**.



International Federation of Library Associations and Institutions (IFLA) World Library and Information Congress 2025 Satellite Meeting at Astana IT University

On August 14–15, 2025, Astana IT University hosted the International Federation of Library Associations and Institutions (IFLA) World Library and Information Congress 2025 Satellite Meeting. The event was organized by the IFLA Bibliography Section, the IFLA Information Technology Section, and the IFLA Artificial Intelligence Special Interest Group. With the theme “Artificial Intelligence, Bibliographic Control and Legal Matters: Navigating New Horizons,” the meeting brought together international library and information professionals to discuss how artificial intelligence is reshaping bibliographic control, metadata practices, and legal aspects of information management.

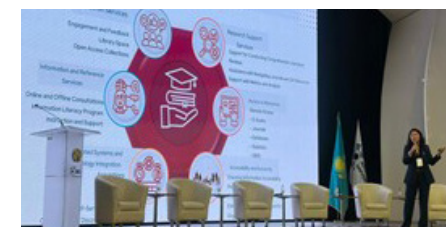
NAZARBAYEV UNIVERSITY LIBRARY AT THE FOREFRONT

One of the distinguished speakers was **Yelizaveta Kamilova**, Head of the Library Research Support Office, Nazarbayev University Library. She presented in the session “AI in the Academic Field: Supporting Research and Learning” with her talk: “**Transforming Services with AI: The Nazarbayev University Library Journey**.”

Her presentation highlighted:

- AI Literacy for the Academic Community – dedicated sessions and workshops for students and faculty introducing AI-assisted literature review tools and citation management systems.
- Innovation in Services – positioning NU Library as a proactive hub for integrating advanced technologies into academic support.
- Balancing Opportunities and Challenges – from improving efficiency and interoperability to addressing ethical considerations in AI adoption.

Through this contribution, NU Library showcased its commitment to fostering AI literacy, enhancing research support, and aligning library services with the needs of a technology-driven academic environment.



MODERATING INTERNATIONAL DIALOGUE

In addition, **Zhuldyz Orazymbetova**, Head of the Patron Services Office, NU Library, served as a moderator during the meeting. Her role emphasized the professional expertise of NU librarians in shaping global discussions on the future of library and information services.

KAZAKHSTAN ON THE GLOBAL MAP OF LIBRARY INNOVATION

The Satellite Meeting proved to be an important platform for:

- Knowledge exchange among global experts in library science and information technology.
- Showcasing Kazakhstan’s contribution to international debates on AI in libraries.
- Strengthening collaboration in adapting library services to the challenges of emerging technologies.

By actively participating at IFLA 2025, Nazarbayev University Library reinforced its international visibility and positioned Kazakhstan as an active voice in the future of library and information services worldwide.

NU Librarians Share Experience on Building Academic Integrity

Republican August Conference of Teachers – 2025 | National Forum on Education and Values



At the Republican August Conference of Teachers – 2025, held under the theme “Honest Citizen – Unified Education: Integration of Values”, Nazarbayev University librarians were among the invited speakers.

Yelizaveta Kamilova (Head of Library Research Support Office) and Zhuldyz Orazymbetova (Head of Patron Services Office) contributed to the Education and Additional Education Panel Session, sharing NU Library's perspective on strengthening academic integrity as part of Kazakhstan's educational reforms.

LAUNCH OF THE “ADAL AZAMAT” PROGRAM

A central focus of the session was the introduction of the new “Adal Azamat” unified educational program, which will be implemented nationwide in all schools starting from the 2025–2026 academic year.

The program aims to instill in schoolchildren values of honesty, diligence, and patriotism, while strengthening ties between schools and society. Recognizing that today's schoolchildren are tomorrow's university students, NU librarians emphasized the importance of early education in integrity and responsible scholarship.

NU LIBRARY'S CONTRIBUTION: PROJECTS AND PRACTICES

In their presentation “Formation of an Academic Integrity Generation: The Library's Role,” the librarians highlighted NU Library's initiatives:

- Integrity Project – promoting academic honesty among students.
- InfoSauattylyq Program – advancing media and information literacy.
- SauattyKeleshek Project – training school librarians and students in ethics, inclusivity, and responsible scholarship.

Together, these projects have already trained hundreds of librarians and schoolchildren, demonstrating how NU Library extends its impact beyond the university and supports the development of a culture of academic integrity at the national level.

COMMITMENT TO VALUES-BASED EDUCATION

Through their participation, NU librarians reaffirmed the University Library's role as an active partner in Kazakhstan's education system. By embedding principles of integrity into both research and learning, NU Library contributes to building a responsible, ethical, and future-ready generation.



Academic Publishing Support and Research Integrity

From September 1 to 12, the Nazarbayev University Library organized and delivered the training course Academic Publishing Support and Research Integrity for all administrative staff and project managers of NURA (Nazarbayev University Research Administration).

PURPOSE OF THE COURSE

The course was designed to support researchers, grant administrators, and academic staff in managing post-award operations, disseminating research outputs, and ensuring compliance with ethical publishing practices.

WHAT PARTICIPANTS LEARNED

Participants explored practical tools and strategies to publish ethically and in line with international standards, identify high-impact journals, and use research metrics responsibly. The workshop also covered the role of AI in academic publishing and common pitfalls affecting publication success and grant compli-

ance. Special attention was given to Nazarbayev University's research policies and global trends in Open Science.

LEARNING OUTCOMES

By the end of the course, participants were able to:

- critically assess the credibility and reliability of academic journals and publishers;
- understand the manuscript submission and peer-review process;
- identify journals aligned with specific research goals through bibliometric indicators;
- maximize the use of reference databases and indices for journal selection;
- distinguish between legitimate and predatory publishing models.

COURSE ORGANIZATION

The course combined self-paced learning with in-person workshops. Participants had access to lecture materials, assignments, and knowledge-checking activi-

ties. Upon successful completion, participants were awarded certificates.



Registration is now open for the next edition of the Academic Publishing Support and Research Integrity course.

- **Dates: November 3–14**

- Platform: [Moodle](#)

Participants can enroll by logging in with their NU credentials. This course provides practical guidance on responsible publishing, journal selection, metrics, and ethical standards to support NU researchers at all career stages.

Participation of Nazarbayev University Researchers in QazaqGaz Scientific & Technological Session



On 2–3 October 2025, the National Company QazaqGaz, together with Nazarbayev University, the Academy of Civil Aviation, the National Laboratory Astana, and other leading institutions, organized the first Scientific & Technological Session (Hackathon) in Astana, aimed at solving pressing technological challenges of the gas industry.

The event gathered key stakeholders, including Minister of Science and Higher Education of Kazakhstan Sayasat Nurbek, Managing Director for Development and Privatization of Samruk-Kazyna JSC Saltanat Satzhan, and Chairman of the Management Board of QazaqGaz JSC Alibek Zhamauev.

The session became a strategic platform for cooperation between QazaqGaz enterprises, engineering companies, technology startups, and the country's leading scientific organizations and universities.

KEY GOALS AND OUTCOMES

- Identification and implementation of innovative solutions for the gas sector.
- More than 100 participants worked on 19 technological challenges, including AI in gas transportation, ESG technologies, efficiency of exploration and production, and optimization of underground gas storage.
- By the end of the session, a pool of ready-to-implement solutions was formed for adoption across QazaqGaz enterprises.



“The gas industry of Kazakhstan faces new challenges requiring advanced technologies and scientific solutions. The aim of today's session is not just to discuss challenges, but to identify innovation projects ready for deployment.”

Sayasat Nurbek, Minister of Science and Higher Education



“Our scientific and technical policy focuses on long-term sustainability and competitiveness. This is about creating an ecosystem where companies, universities, and research centers work together.”

Saltanat Satzhan, Samruk-Kazyna



“We are building a comprehensive scientific and technical system – from identifying production issues to scaling and commercializing R&D outcomes. A digital platform integrating AI for testing and implementing innovations is under development.”

Alibek Zhamauev, QazaqGaz



Nazarbayev University and Purdue University hold round table to advance collaboration in AI, energy, and sensor technologies



On August 5, PI “National Laboratory Astana” (NLA), Nazarbayev University, hosted a Round Table discussion with Purdue University (USA) to explore new avenues for joint research in artificial intelligence (AI), energy systems, and advanced sensor technologies.



The event brought together leading academics and researchers from both institutions. The Purdue delegation was led by Professor Lefteri H. Tsoukalas, a distinguished expert in sensor technology, AI, and nuclear energy with more than three decades of research experience, over 300 publications, and several influential textbooks to his name.

Nazarbayev University participants included:

Prof. Zhumabay Bakenov – Vice Provost for Research and Innovation; Director, Center for Energy and Advanced Materials Science, NLA; Professor, School of Engineering and Digital Sciences.

Dr. Baktiyar Soltabayev – Head, Laboratory of Advanced Sensors, NLA.

STRATEGIC PRIORITIES DISCUSSED AT THE ROUND TABLE

During the Round Table, both sides identified priority areas for future cooperation, including:

- Nuclear Energy with Artificial Intelligence (AI)
- The AI-Energy Nexus

- Advanced gas sensor technologies
- AI and its applications in nuclear power plant and advanced sensor systems
- Materials science for next-generation energy applications with use of AI

Opening the session, Dr. Baktiyar Soltabayev emphasized the mutual benefits of the partnership, noting the potential to advance sensing technologies, broaden AI applications, and drive innovation in materials science. Prof. Bakenov introduced research areas at NU and NLA and highlighted the significant research achievements of the Laboratory of Advanced Sensors under the leadership of Dr. Soltabayev, which in a very short time since establishment gained an excellent track record of successful research projects and innovations.

In his address, Prof. Tsoukalas provided an overview of Purdue University's history, academic strengths, and research capabilities, emphasizing the institution's leadership in nuclear engineering, AI policy, and interdisciplinary problem-solving in energy and sensing.

AGREED NEXT STEPS

The Round Table concluded with an agreement to:

Prepare and sign a Memorandum of Cooperation between Nazarbayev University, PI “National Laboratory Astana” and Purdue University.

Initiate a Memorandum of Understanding (MoU) between Nazarbayev University and Purdue University to formalize broader institutional collaboration.

This Round Table marked an important milestone in building a strategic partnership that will unite the expertise of Nazarbayev University, National Laboratory Astana, and Purdue University to tackle global challenges in energy resilience, AI integration, and next-generation sensor technology.

NU hosted guest lecture on “the AI-energy Nexus”

By Distinguished Purdue University Professor

On August 5, the Advanced Sensors Laboratory at National Laboratory Astana hosted a special guest lecture by Professor Lefteri H. Tsoukalas, a world-renowned expert in artificial intelligence (AI), sensor technology, and energy systems from Purdue University, USA.

The lecture, titled “The AI–Energy Nexus”, was held in Block C3, Conference Room 1010/1 and drew an audience of faculty members, researchers, and graduate students from across the university.

EXPLORING THE INTERSECTION OF AI AND ENERGY INNOVATION

Professor Tsoukalas, the founding director of Purdue University's **Center for Intelligent Energy Systems (CIENS)**, shared insights from over three decades of research at the forefront of AI/ML applications in critical infrastructure. He highlighted how AI is transforming nuclear energy systems, smart grids, and sensor-based diagnostics, as well as its potential to shape the future of sustainable and resilient energy solutions.

A key part of his talk featured Purdue's **PUR-1 reactor**, the first all-digital instrumentation and control system in the United States, showcasing how AI-driven systems can enhance safety, efficiency, and innovation in nuclear technology.

GLOBAL EXPERTISE, LASTING IMPACT
Professor Tsoukalas has authored more than 300 publications and several influential textbooks, including:

- Fuzzy and Neural Approaches in Engineering (Wiley, 1997)
- Fuzzy Logic: Applications in Artificial Intelligence, Big Data, and Machine Learning (McGraw Hill, 2024)
- Energy Transitions: The AI–Energy Nexus (World Scientific, 2025)

He is a Fellow of the American Nuclear Society, a recipient of the **Humboldt Prize** (Germany's highest honor for international scientists), and has advised leading organizations such as the OECD-NEA, IAEA, and ASTAR Singapore.

STRENGTHENING INTERNATIONAL COLLABORATION

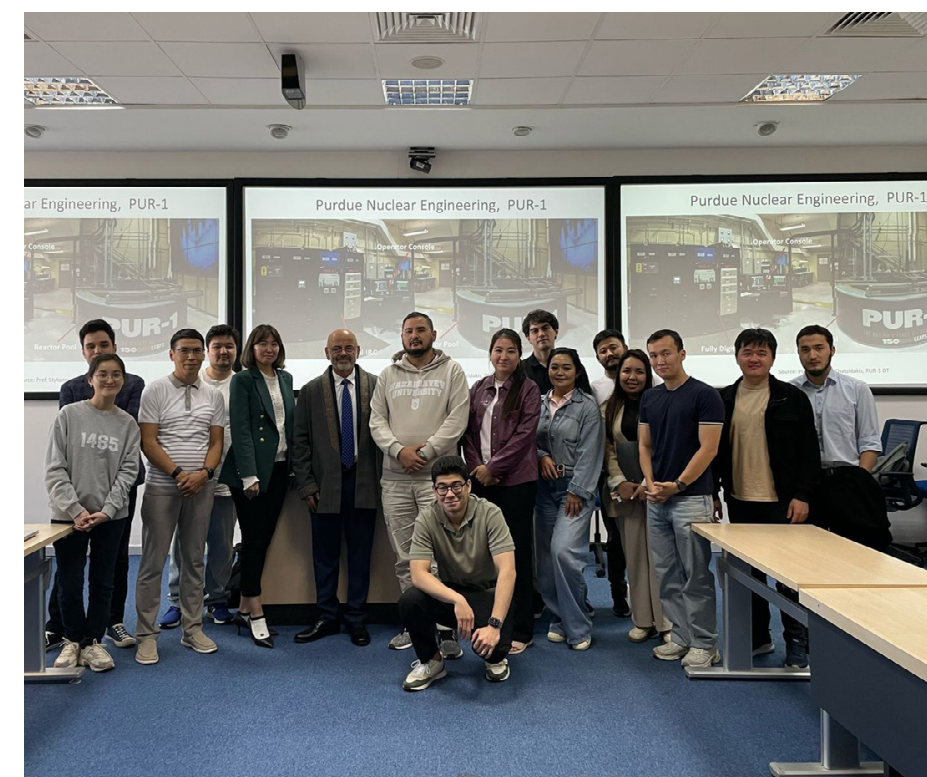
The guest lecture was part of Professor Tsoukalas's visit to Nazarbayev University, which also included a Round Table discussion with NU and NLA leadership on advancing joint research in AI, energy systems, and advanced sensor technologies. The two institutions agreed to initiate formal cooperation through a Memorandum of Understanding, setting the stage for future collaborative projects.

Dr. Baktiyar Soltabayev, Head of the Advanced Sensors Laboratory and organizer of the lecture, emphasized the importance of such academic exchanges:

“This event not only provided our students and researchers with access to cutting-edge knowledge but also strengthened our global research partnerships in areas crucial to Kazakhstan's energy future.”



The Advanced Sensors Laboratory continues to foster international collaboration, bridging academic excellence and technological innovation to address the most pressing challenges in energy and sensing technologies.



Life Sciences Today 2025 – Celebrating 15 Years of Innovation at the Center for Life Sciences: From Discovery to the Bedside



The event opened with welcome notes from:

- **Ahmad Waqar**, President of Nazarbayev University
- **Prof. Dos Sarbassov**, General Director of the National Laboratory Astana
- CLS founders **Prof. Zhaxybay Zhumadilov** and **Prof. Almaz Sharman**

Their speeches reflected on the Center's growth, impact on Kazakhstan's biomedical landscape, and international collaborations.



The scientific program showcased the Center's leadership in multiple fields of modern biomedicine. In **genomics and personalized medicine**, CLS researchers presented pioneering work, including the **creation of the Kazakhstan Reference Database of Genomic Variants** by the Laboratory of Genomic and Personalized Medicine (CLS, NLA). Studies on the **genetic basis of cardiovascular diseases** were shown to have been successfully translated into clinical practice at the University Medical Center through the use of **whole-genome and exome sequencing** to explore cardiomyopathy, atherosclerosis, and cardiac arrhythmias.

A keynote by **Professor Bart Loeys** (Belgium), the discoverer of Loeys-Dietz syndrome, provided new insights into the genetics of **hereditary aortopathies**, connecting global expertise with local scientific ambitions.

CANCER BIOLOGY & DRUG DEVELOPMENT

This session addressed both **fundamental mechanisms** and **applied research**:

- **Prof. Gerry Melino** and **Prof. Mauro Piacentini** (Italy) discussed the **p53 family pathways** and **metabolic reprogramming in liver cancer**

Discussions explored **tumor resistance to CAR-T therapy**, outlining challenges and breakthroughs in oncology

The session on **Microbial Communities and Immune Responses** examined the intricate relationships between the **microbiome, immunity, and systemic health**. Presentations covered the microbiome landscape in infants and adults with autoimmune and cardiovascular disorders.

A keynote by **Prof. Hans-Uwe Simon** (Switzerland) *explored the role of microbiota in cognitive function and dementia*, revealing emerging links between microbial ecosystems and brain health.

The **Neurodegenerative Research** session brought together international and local scientists to discuss **Alzheimer's, Parkinson's disease**, and dementia from clinical, genetic, and microbiome perspectives. Keynotes by **Prof. Daniel C. Anthony** (University of Oxford) and **Prof. Joseph H. Lee** (Columbia University) connected systemic inflammation with neurodegeneration and introduced integrative approaches to studying Alzheimer's disease. Research from CLS laboratories showcased Kazakhstan's contributions to the **epidemiology and molecular profiling of Alzheimer's disease**.



The **Regenerative Medicine and Bioengineering** session highlighted cutting-edge progress in **tissue regeneration, biomaterials, and translational bioengineering**. **Prof. Julietta Rau** (Italy) provided insights into the development of **antimicrobial and implantable biomaterials**. The session demonstrated how regenerative science is rapidly moving from the laboratory to clinical practice.

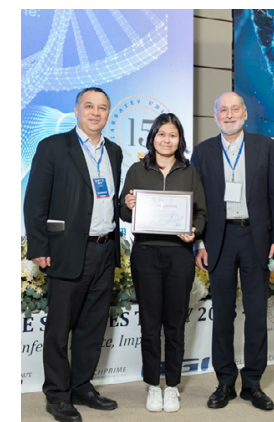
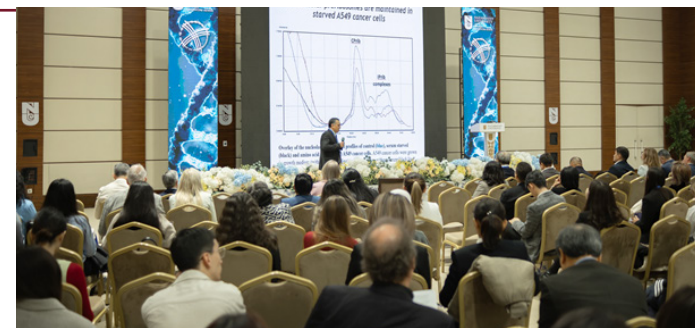
A **special highlight** of the second day was the **official visit of Minister of Science and Higher Education, Sayasat Nurbek**, who congratulated CLS on its 15-year anniversary. In his greeting speech, the Minister emphasized the **strategic importance of**

biomedical sciences in Kazakhstan and the **transformative potential of artificial intelligence** in advancing research and healthcare.

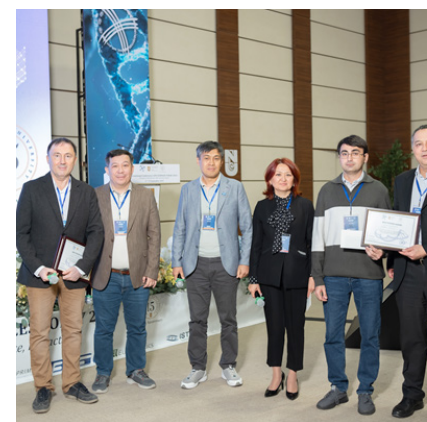
The final day of Life Sciences Today 2025 opened with a keynote by **Prof. Thomas Jentsch** (Germany) on the physiology and pathology of anion transport. It was followed by the **Young Scientist Competition**, where early-career researchers presented studies on immune disorders, cancer biology, asthma risk, microbiome-immune interactions, and gene regulation. The Poster Session further showcased a diverse range of projects, fostering collaboration and networking among participants.

The Life Sciences Today 2025 conference reaffirmed the Center for Life Sciences' position as a bridge between Kazakhstan and the global scientific community, promoting collaboration, innovation, and a shared vision for the future of biomedicine.

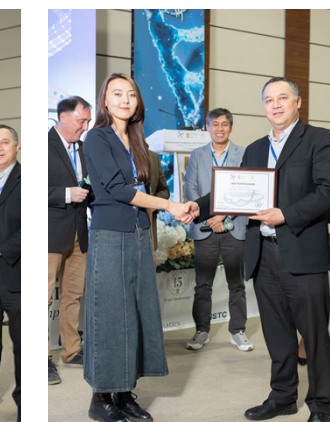
The day concluded with the Award Ceremony, celebrating the next generation of scientists.



Best Oral Presentation – **Aiman Jalmukhambetova**



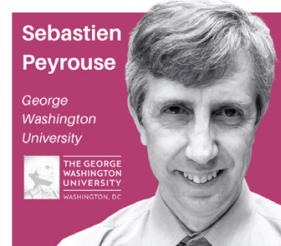
Best Poster Presentations – **Aidar Dairov, Altyn Zhuraliyeva, and Nurislam Mukhanbetzhanov**



NU Annual Research Conference 2025

Empowering Innovation: Nurturing Kazakhstan's Next-Gen Researchers

INVITED SPEAKERS



Nazarbayev University
September 17-19, 2025

*Empowering Innovation:
Nurturing Kazakhstan's
Next-Gen Researchers*

From September 17 to 19, Nazarbayev University welcomed the research community to the second Annual Research Conference – www.arc.nu.edu.kz. This year's theme “Empowering Innovation: Nurturing Kazakhstan's Next-Gen Researchers” placed the spotlight on the essential role of mentorship, faculty engagement, and hands-on research experience in shaping the innovators of tomorrow.

OVERVIEW

The **Nazarbayev University Annual Research Conference (NUARC 2025)** once again served as a premier interdisciplinary platform for researchers, faculty, students, and partners from Kazakhstan and abroad.

PARTICIPATION AND REACH

- 189 abstracts were submitted and reviewed by a panel of 40 reviewers.
- 9 countries (across 4 continents) were represented among first authors, and 30 countries among co-authors.
- The conference attracted 272 registered presenters and participants.
- Sessions received a total of 3,940 global views.
- The NUARC 2025 virtual platform will remain active until mid-2026 via Oxford Abstracts, ensuring extended visibility of presentations and posters.

KEY FEATURE

The first environmentally friendly conference - NUARC 2025 set a new standard for sustainable academic events at NU, integrating digital accessibility, interdisciplinary collaboration, and global engagement reflecting NU's mission to advance research excellence in Kazakhstan and beyond..

At the opening of the conference, NU Vice Provost for Research and Innovation, Zhumabay Bakenov, emphasized: “In line with our commitment to sustainability and innovation, NUARC 2025 is being held in a fully digital format. This year, we’ve eliminated printed posters and handouts

This year's conference was led by General Chair **Prof. Zhumabay Bakenov** (Vice Provost for Research), with Program Chairs **Prof. Essam Shehab** (Head of Mechanical and Aerospace Engineering Department, SEDS) and **Prof. Jessica Neafie** (SSH), and Co-Chair **Prof. Dina Sharipova**.

PROGRAM HIGHLIGHTS

- 3 World-class Keynote Lectures, 20 Oral Presentation Sessions, and 10 Digital Poster Sessions.
- 2 Expert Panels, 1 Student Panel, and 2 Workshops addressing emerging challenges in science, engineering, and social sciences.
- 20 Judges selected the best poster awards; 33 Session Chairs supported oral sessions.
- Youngest presenters: Tomiris Almukhanbetova and Arina Shiryayeva, showcasing NU's encouragement of student research engagement.

– the entire program is accessible online via QR code. Poster sessions are presented digitally, and thanks to our colleagues at ISSAI, we’ve introduced the TiSync real-time speech recognition app, enhancing accessibility. Additionally, all plenary sessions and panel discussions are streamed live on YouTube, allowing us to engage a wider audience beyond the conference hall. This digital approach not only reduces our environmental impact but also reflects our commitment to integrating technology into every aspect of research and knowledge exchange.”

A PLATFORM FOR COLLABORATION AND GROWTH

The three-day event brought together faculty, scholars, and students from Kazakhstan and abroad, creating a dynamic platform for interdisciplinary exchange. Participants explored fresh perspectives, shared methodologies, and forged collaborations



ORAL AND POSTER PRESENTATIONS

A core part of NUARC-2025 was the showcase of Oral and Poster sessions, which highlighted cutting-edge research conducted across Kazakhstan and Central Asia.



across fields through poster sessions, panel discussions, keynote lectures, and interactive workshops.

NUARC-2025 reaffirmed that building a supportive academic ecosystem is crucial to addressing today's global challenges and to ensuring that early-career researchers can thrive in it.



Spanning NU's five strategic research priorities, these sessions provided a platform for both established academics and early-career researchers to present their findings, exchange perspectives, and build collaborative networks.



Three Minute Thesis (3MT®) Competition



As part of NUARC-2025, Nazarbayev University proudly hosted the Three Minute Thesis (3MT®) Competition, an internationally recognized research communication challenge originally developed by The University of Queensland (UQ), Australia.

[Check out the NU 3MT Website](#)



2025 NU 3MT® FINALISTS

We congratulate this outstanding group of finalists, who rose to the challenge and presented their research with clarity, confidence, and passion:



The 3MT cultivates students' ability to present their research in a concise, engaging, and accessible manner, requiring participants to explain the essence of their PhD projects in just three minutes. Beyond testing communication skills, the competition strengthens the profile of doctoral research both within academia and in the wider community.

WHY IT MATTERS

- Gain insights into groundbreaking research across disciplines.
- Support NU's talented graduate students.
- Witness the communication skills of the next generation of innovators.
- Network with fellow academics and professionals.

Winner & People's Choice

Makpal Rakhatkyzy, PhD Candidate,
School of Engineering and Digital Sciences

Title: Agricultural Waste → Tomorrow's Bioplastics

Kazakhstan produces over 5 million tons of agricultural waste each year, most of which is burned or discarded, releasing greenhouse gases and causing environmental harm. My research offers a sustainable solution by converting this waste into valuable bioplastics using an innovative flow reactor and green catalytic system. This process not only achieves high yields but also reduces energy consumption and carbon emissions. By transforming low-value waste into high-value sustainable materials, my work addresses both plastic pollution and agricultural waste challenges, paving the way for greener industries and a circular bioeconomy in Kazakhstan and beyond.

Runner-Up

Reza Khoramian, PhD Candidate, School of Mining and Geosciences

Title: From Gas to Rock: Securing CO₂ for Future Generations

Storing CO₂ deep underground is a promising solution to climate change, but its long-term security remains uncertain. My research focuses on two critical factors that control whether CO₂ stays trapped or escapes. First, rock wettability – whether rocks prefer water or CO₂ – determines how the gas spreads and becomes trapped. Second, rock dissolution occurs when injected CO₂ forms carbonic acid, which can both mineralize the CO₂ into stable solids or weaken the rock structure. By linking these processes, my work predicts safe versus risky storage scenarios, enabling cleaner environments and secure carbon management for future generations.

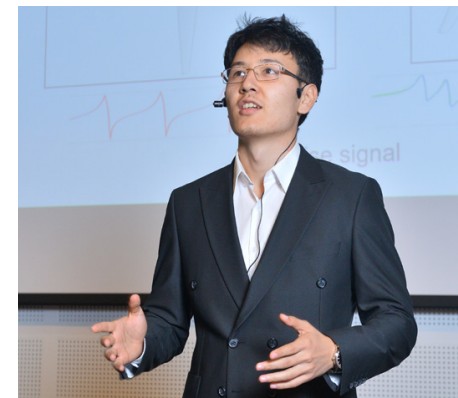


Finalists

Assel Shakuliyeveva – PhD Candidate, Graduate School of Education

Title: The PhD Illusion: First-Generation Scholars Trapped in Kazakhstan's 3-Year Service Mandate

Kazakhstan has over 7,600 PhD students, yet fewer than one in five complete their degrees. Almost all rely on state funding, which comes with a three-year service mandate in public institutions. While designed to ensure return on investment, this policy narrows graduates' choices, blocks private sector and international careers, and often requires retrospective consent. Through interviews with first-generation PhDs, policy analysis, and visual narratives, my research reveals how these mandates silence graduates' voices and disrupt aspirations. By putting their lived experiences into the policy conversation, I show how doctoral futures, and national innovation, are constrained by structural design.



Chingiz Arystanbekov – PhD Candidate,
School of Engineering and Digital Sciences

Title: Smarter Blade Positioning, Quieter Drones

My PhD research focuses on reducing noise from propellers, a critical challenge for the future of drones and electric air taxis. Instead of relying on heavy or costly solutions, I study how simply adjusting the spacing between blades can reduce noise at the source. Using advanced simulations, mathematical models, and experimental testing, I analyze how different blade arrangements affect the way sound propagates in the air. This work could make next-generation aircraft quieter, safer, and more acceptable in cities. Ultimately, I aim to provide engineers with practical design strategies for sustainable, low-noise aerial mobility.



Kathiresan Sivakumar – School of Humanities and Social Sciences

Title: Synchronizing Neural Networks for Secure Communications

This thesis investigates the synchronization and control of neural networks with a focus on secure communication applications. The work develops theoretical frameworks for analyzing stability and synchronization in complex neural systems subject to delays, uncertainties, and cyberattacks. Advanced control strategies, including event-triggered mechanisms, pinning control, and Markov-switching approaches, are proposed to achieve efficient and resilient synchronization. The theoretical results are validated through numerical simulations and applied to secure image and data encryption, demonstrating practical relevance. Overall, this research bridges nonlinear systems theory and information security, offering robust methods for reliable and secure communication via neural network dynamics.



Wazir Arif Hussain, PhD Candidate, Graduate School of Public Policy

Title: Ethical leadership to Curb Corruption in Public sector organizations: A mixed methods Study

Despite the various measures undertaken, still Corruption remains a significant challenge for governments around the world, particularly in developing countries, where it can undermine governance, transparency, socio-economic development, and public trust. Therefore, my study aims to investigate whether and how ethical leadership mitigates corruption in public sector and what role organizational justice and public service motivation play in this process. To answer this question, I conducted surveys and interviews with public servants from central ministries in Pakistan. The findings demonstrate that ethical leadership positively related with organizational justice which in turn, reducing corruption, thereby showing that ethical leadership matters.

CONTACT INFORMATION:

For school-level competition registration, contact your school PhD students coordinator. For general questions, NU Wildcard, and NU Finale contact us at 3mt@nu.edu.kz or the NU 3MT administrator, Gulnaz Bulebayeva, at gbulebayeva@nu.edu.kz.

Sustainable Development Solutions Network Highlights

SDSN Kazakhstan's Contribution to the 2025 Voluntary National Review

VOLUNTARY NATIONAL REVIEW
of the Implementation of the 2030
Agenda for Sustainable Development



SDSN Kazakhstan contributed to and was included among those involved in formulating Kazakhstan's official Voluntary National Review (VNR) 2025 – the country's report to the United Nations highlighting national progress, challenges, and priorities in implementing the 2030 Agenda for Sustainable Development.

The VNR preparation process engaged a wide range of stakeholders involved in implementing the Sustainable Development Goals in Kazakhstan.

Among its recommendations, SDSN Kazakhstan highlighted that SDG 4: Quality Education and SDG 3: Good Health and Well-Being remain the top national priorities, followed by SDG 8: Decent Work and Economic Growth, SDG 1: No Poverty, and SDG

16: Peace, Justice, and Strong Institutions. SDSN Kazakhstan also noted that public awareness of the SDGs remains low, with only 20% of respondents demonstrating a good understanding. The engagement of SDSN Kazakhstan in the VNR process underscores its commitment to supporting evidence-based policymaking and fostering inclusive participation in advancing sustainable development across Kazakhstan. [Read more](#)

SDSN Kazakhstan Shared Experience in virtual session in Uzbekistan



On July 8, a high-level hybrid launch ceremony was held in Tashkent, Uzbekistan, marking SDSN's partnership with the Ministry of Economy and Finance. Following the ceremony, SDSN hosted a series of technical workshops, including a session on the Networks Program.

During the July 9 session, SDSN Kazakhstan Co-Chair Serik Orazgaliyev and SDSN Kazakhstan Manager Malika Tazhmuratova delivered a virtual presentation, sharing their experience in establishing SDSN Kazakhstan. They provided an overview of the network's key activities and highlighted their roles in advancing sustainable development initiatives.

The session brought together local government officials and select academic representatives, who engaged with the discussion and expressed interest in applying lessons from Kazakhstan's experience to the development of a national SDSN network in Uzbekistan. [Read more](#)

Updates on the SDG nexus Network Team at Nazarbayev University

The SDG Nexus Network team at Nazarbayev University (NU), led by Dr. Aliya Assubayeva, continues to expand its expertise. Dr. Kamiliya Yessimbet, Postdoctoral Research Associate, joined the project, bringing experience in climate science, environmental monitoring, and satellite remote sensing. The team also includes PhD student Yelif Ulagpan and Master student Symbat Ibadulla.

Implemented in close collaboration with SDSN Kazakhstan, the network connects re-

searchers, educators, decision-makers, and practitioners across Central Asia. As part of the DAAD "exceed" program, the SDG Nexus Network aims to strengthen higher education, promote joint research, train the next generation of scientists, and foster collaboration among universities and external partners.

The SDG nexus Network project is funded by the German Academic Exchange Service (DAAD) using funds from the Federal Min-

istry for Economic Cooperation and Development (BMZ), SDGnexus Network (grant number 57753302), program "exceed 2025-2029: Hochschulexzellenz in der Entwicklungszusammenarbeit". [Read more.](#)



Prof. Jeffrey D. Sachs Participated in SDG Monitoring Seminar in Uzbekistan



On 8–9 July 2025, Uzbekistan hosted a training seminar organized by the Ministry of Economy and Finance with the support of the Sustainable Development Solutions Network (SDSN) and the French Development Agency (AFD).

The event focused on "Enhancing SDG Monitoring Capacity in the Regions of Uzbekistan." A key highlight of the forum was the participation of SDSN President, Columbia University professor, and renowned global economist Jeffrey D. Sachs. During

his lecture, Professor Sachs elaborated on the major global challenges countries faced in achieving the Sustainable Development Goals (SDGs) and praised Uzbekistan's efforts in this direction.

He emphasized the importance of establishing and strengthening monitoring systems at the regional level, noted the progress Uzbekistan had made in implementing the sustainable development agenda, and highlighted the need for deeper international cooperation. [Read more](#)

The 2025 edition of the Sustainable Development Report (SDR) has been released

This milestone report features the SDG Index and Dashboards, ranking all UN Member States on their performance across the 17 Sustainable Development Goals (SDGs). New this year is the SDGi, tracking progress using 17 headline indicators, alongside a new platform to monitor countries' engagement with the UN system through the UN-based Multilateralism Index (UN-Mi).

KEY FINDINGS FROM SDR 2025:

- 190 countries have now engaged in Voluntary National Reviews (VNRs) – showing global commitment to the 2030 Agenda.
- Nordic countries lead the SDG Index, but East and South Asia show the fastest

progress since 2015.

- No SDG is on track globally. Only 17% of targets are progressing – highlighting the need for urgent action.

- Reforming the Global Financial Architecture (GFA) is critical to unlock the investment needed for sustainable development.

Kazakhstan ranks 70th out of 167 countries, with an index score of 71.5 – just below the regional average, but with a 5.1-point improvement since 2015. The country shows strong performance on SDG 1 (No Poverty), SDG 4 (Quality Education), and SDG 7 (Affordable & Clean Energy), but faces challenges on SDG 3, 5, 6, and 8. [Read more](#)



SDSN Member Maqсут Narikbayev University hosted Lecture on Net Zero and Global Environmental Challenges

Maqсут Narikbayev University hosted a lecture "The Rocky Road to our Better Future: managing the Net Zero transition and global pollution challenges in uncertain times" by Dr. Joshua Lincoln, Fletcher School.

Dr. Lincoln examined the complex global shifts since the 2015 Paris Climate Agreement, focusing on economic, geopolitical, and environmental challenges involved in achieving Net Zero. He also highlighted the ongoing plastics treaty negotiations as a key example of the interplay between science, governance, and international cooperation. This event reflects MNU's commitment to advancing critical discussions on sustainability, climate action, and global governance through academic and public engagement. [Read more.](#)



CARCEIT NEWS



The Central Asian Research Centre for Educational Innovation and Transformation is dedicated to advancing education research and innovation in Central Asia. As part of the Graduate School of Education at Nazarbayev University, CARCEIT aims to shape global knowledge, influence education policy and leadership, and build a robust regional research community. CARCEIT is dedicated to driving innovation and transformation of educational practices across the region.



Dear Readers,

This quarter has been marked by numerous milestones worth celebrating. From new publications on teacher agency in peace education to a higher education paper exploring pathways of change, to vibrant knowledge exchanges with schools and ministries, and to international conferences putting sustainability and well-being at the heart of education and health, CARCEIT continues to grow as a hub for research and collaboration in Central Asia.

These achievements are possible thanks to the dedication of our researchers, partners, and supporters like you. I warmly invite you to keep following our journey, share our work, and stay connected through our website and social media channels. Your encouragement fuels our efforts to advance educational innovation and transformation across the region and beyond.

Warmly,
Naureen Durrani
Director, CARCEIT (www.carceit.nu.edu.kz)

NEW PUBLICATIONS

Latest Study on Geopolitics of Higher Education Internationalisation in Kazakhstan

The study titled “Geopolitics of Internationalisation of Higher Education in the Context of Conflict: Evidence from Kazakhstan, explores how Kazakhstani universities are adapting to regional conflicts using the SAIOS framework (Scales, Actors, Interests, Opportunity Structures). Drawing on interviews with university leaders, the study highlights the strategic responses institutions employ to sustain international collaboration and mobility in

the face of shifting geopolitical landscapes. Positioned at the crossroads of regional powers, Kazakhstan offers a unique case for understanding resilience and adaptability in higher education. The study provides timely insights into how universities navigate global instability while advancing internationalisation agendas. The paper can be accessed by this [DOI](#).

Outpacing Reforms: Lived Realities of Organizational Change in Regional Universities in a Post-Socialist Context

This article published in the prestigious journal *Studies in Higher Education*, ranked in the top 97th percentile in Scopus, investigates how processes of organizational change unfold in regional universities, adopting a blended framework that integrates rationalist and emergent perspectives. Drawing on strategic plan analysis and interviews with administrators and faculty, the research highlights the lived realities of transfor-

mation within non-dominant and resource-limited higher education contexts. By shedding light on how reforms are enacted in practice, the study contributes valuable insights for scholars, policymakers, and higher education leaders engaged in institutional change and regional development. The paper can be accessed by [here](#).

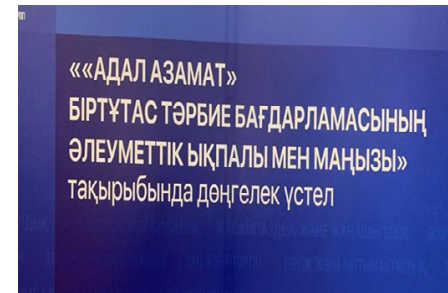
New Study Highlights Role of Teacher Agency in Promoting Positive Peace Education in Rural Kazakhstan

Researchers Aizat Arystanbek, Nuraimy Seitova, Lynne Parmenter, and Gulbagira Toleu have published an article “Positive Peace Education in Rural Schools: Recognizing Teacher Agency in Addressing Structural and Cultural Violence” in the journal *Pedagogical Dialogue* by the Center for Pedagogical Excellence. The study based on action research with 19 rural teachers shows how Positive Peace Education (PPE) helped schools shift from punitive discipline to relational practices, tackle structural inequities such as class labelling and resource shortages, and challenge cultural violence like stigmatization and language bias. Rooted in teacher agency and local values, PPE proved to be a low-cost, effective approach for transforming education in resource-limited rural contexts, positioning teachers as changemakers committed to equity and community well-being. The findings are available both in English and Kazakh and can be accessed from [here](#).



CONFERENCES

CARCEIT Team Joins International Roundtable on Values-Based Education in Astana



ADVANCING POSITIVE PEACE EDUCATION IN KAZAKHSTAN

On September 9, a researcher from Nazarbayev University's International Collaborative Education Project (ICEP) on Positive Peace Education in Kazakhstan took part in a high-level international roundtable in Astana. The event brought together professors and experts from Asia, Europe, and Kazakhstan to discuss the Unified Educational Programme “Adal Azamat”, designed to foster a harmonious, responsible, and globally competitive generation.

DISTINGUISHED PARTICIPANTS

The roundtable gathered key leaders and educators, including:

- **Gani Beisembayev**, Minister of Education of the Republic of Kazakhstan
- **Bibigul Zheksenbay**, Deputy of the Senate
- **Prof. Tom Harrison**, Deputy Pro-Vice-Chancellor and Director, Jubilee Centre for Character and Virtues, University of Birmingham (UK)
- **Prof. Liao Shao Jun**, Department of Moral Education, Nanyang Technological University (Singapore)
- **Ms. Jasmine Seang**, Deputy Director, Education Committee, Ministry of Education, Singapore

KEY INSIGHTS & GLOBAL PERSPECTIVES

Prof. Tom Harrison highlighted the role of innovation in education, character formation, and digital wisdom, underscoring how values-driven learning strengthens

civic responsibility and ethical leadership. Prof. Liao Shao Jun shared Singapore's experience in moral and civic education reforms, emphasizing their impact on youth development and resilience.

Ms. Jasmine Seang outlined Singapore's Character Education guiding principles: student centricity, intentionality (clear goals and age-appropriate values), and coherence as critical elements of sustainable educational success.

TOWARDS COLLABORATIVE EDUCATIONAL REFORM

The event underscored the importance of international collaboration and research-based policy development in advancing Kazakhstan's education system. Through such initiatives, Nazarbayev University and its partners continue to contribute to building a values-oriented and inclusive educational environment aligned with global best practices.

NU to Host International Conference on Planetary Health and Sustainable Healthcare

As part of Nazarbayev University's 15th anniversary celebrations, the Qaz Green Health team, led by Dr. Jonas Cruz and Dr. Paolo Colet from the School of Medicine, will co-organize the 1st Nazarbayev University International Conference on Planetary Health and Environmentally Sustainable Healthcare on December 4–5, 2025. The event is jointly organized by NU's School of Medicine, CARCEIT, and University Medical Center.

The central theme of the conference is “Healthcare and Sustainability: Navigating the Future of Green and Resilient Health Systems.” The event will address the urgent need for environmentally sustainable and climate-resilient healthcare systems, exploring strategies to develop eco-friendly solutions that reduce environmental impact while ensuring high-quality patient care. Specifically, it will highlight innovative approaches to reducing healthcare costs and ecological footprints, improving energy efficiency, strengthening climate adaptation, and implementing sustainable health policies at both national and global levels.

As NU's first international conference dedicated to planetary health and sustainable healthcare, it seeks to bring together researchers, healthcare professionals, public health specialists, policymakers, faculty members, and students from Kazakhstan, Central Asia, and beyond to exchange knowledge and solutions.

KEY DATES:

- Abstract submission deadline: October 20, 2025
- Registration deadline: November 15, 2025
- Conference dates: December 4–5, 2025

Abstract Submission: <https://forms.gle/x6V5aDJLuRT6mR7A>
Registration: <https://forms.gle/3cUoNxj67BFTUAMn6>
For inquiries, please contact qazgreenhealth@nu.edu.kz.

1st NAZARBAYEV UNIVERSITY INTERNATIONAL CONFERENCE ON PLANETARY HEALTH AND ENVIRONMENTALLY SUSTAINABLE HEALTHCARE

Healthcare and Sustainability: Navigating the Future of Green and Resilient Health Systems

December 4–5, 2025

NU School of Medicine, 5/1 Kerey and Zhanibek Khandar Street, Astana

We invite you to participate in the university's first international conference on planetary health and environmentally sustainable healthcare. This conference addresses the urgent need for sustainable and climate-resilient healthcare systems.

Important dates:

- Submission of Abstract: October 20, 2025
- Notification of Accepted Abstracts: October 31, 2025
- Registration: Until November 15, 2025

Register now For more information visit

KNOWLEDGE
EXCHANGE

CARCEIT Team Shares Findings on Positive Peace Education with Ustaz Alliance

On August 12, our researchers presented their three-year project “Positive Peace Education in Kazakhstan” in a webinar with the Ustaz Alliance community. The session was conducted by Aizat Arystanbek, Gulbagira To-leu, and Nuraiym Seitova, and brought together teachers, school leaders, and education stakeholders. The team shared the project’s goals, methodology, findings, im-pact, and recommendations, while participants engaged in an active dialogue. Key points raised included the need to adapt the project title to Kazakh cultural concepts, refine translations, enrich curriculum content, and address issues such as lack of mutual respect under the idea of “negative peace.” Participants praised the project’s action research approach and

expressed appreciation for the researchers’ ability to present complex academic ideas in a clear and practical way.



Institute for Supplementary Education and Well-being Welcomes NU Research Team

On September 16, the CARCEIT project team for “Nurturing Young Minds: Exploring the Role of Positive Early Childhood Education and Care in the Health and Well-being of Young Children in Kazakhstan” visited the Supplementary Education (Extracurricular Activities) and Well-being Institute under the Ministry of Education, where they introduced their on-going project on young children’s well-being and received an over-view of the Institute’s activities and priority areas. An open exchange identified shared interests and outlined potential pathways for joint initiatives to support children’s holistic de-velopment.



CAPACITY
BUILDING

Well-being Education Meets Technology: CARCEIT Seminar Highlights Innovations for Schools

On September 15, CARCEIT hosted a seminar titled “The Future of Well-being Education: Exploring the Role of Technology and AI Potential in Schools.” Delivered by Prof. Dianne Vella-Brodrick, Gerry Higgins Chair of Positive Psychology and Director of the Centre for Well-being Science, Faculty of Education, University of Melbourne, the seminar brought together faculty, researchers, and students to explore the intersection of technology and well-being education in schools. The session highlighted in-novative approaches to personalizing well-being initiatives for students while

also considering ways to streamline im-plementation for educators. Participants engaged in a forward-looking discus-sion on the promise and limitations of artificial intelligence (AI) in enhancing student well-being, reflecting on how emerging technologies can be meaning-fully integrated into educational prac-tice. This event contributed to CARCEIT’s ongoing efforts to build capacity in ev-idence-based approaches to education, equipping stakeholders with knowledge on how digital tools and AI may shape the future of well-being education in Kazakhstan and beyond.



PROMOTING WELL-BEING IN EARLY CHILDHOOD EDUCATION
On September 18, 2025, the Center for Applied Research and Creativity in Education, Innovation and Technology (CAR-CEIT) hosted a roundtable titled “Improv-ing Well-being in the Preschool Education and Training System: Policy and Practice.”

The event formed part of the CAR-CEIT-funded project “Nurturing Young Minds: Exploring the Role of Positive Early Childhood Education and Care (ECEC) in the Health and Well-being of Young Chil-dren in Kazakhstan,” conducted in collab-oration with the University of Melbourne.

Roundtable on Early Childhood Well-being Brings Together Key Stakeholders

Led by Professor Daniel Hernández-Tor-rano (Nazarbayev University Graduate School of Education, Principal Investiga-tor) and Professor Dianne Vella-Brodrick (Gerry Higgins Chair in Positive Psycholo-gy and Director of the Centre for Wellbe-ing Science, University of Melbourne), the research team presented an overview of the project, its key findings, and a series of practical tools and resources designed for educators and policymakers.

shared insights on effective practices, policy challenges, and emerging opportu-nities to enhance child well-being within Kazakhstan’s preschool education system. The discussions concluded with an in-teractive Q&A session, offering space for open reflection and exchange among re-searchers, educators, and policymakers.

IMPACT AND OUTLOOK
The event served as a platform for col-laboration bridging research, policy, and practice to promote holistic development and well-being for young children in Ka-zakhstan. The outcomes will inform future strategies and policy recommendations for strengthening positive early childhood education across the country.

COLLABORATION AND DIALOGUE
The roundtable gathered representatives from the Ministry of Education, the Al-tynsarin Academy, the Institute of ECEC, UNICEF, Eurasian National University, and several ECEC providers. Participants

EMERGING RE-
SEARCH FINDINGS

ICEP on Nurturing Young Minds’ Findings Show Multiple Routes to Well-being in Early Childhood Education

As part of ICEP project, “Nurturing Young Minds: Exploring the Role of Early Childhood Education in Promoting the Health and Well-being of Young Children in Kazakhstan,” researchers ex-plored how Kazakhstani children aged 4-7 experience happi-ness in kindergarten through a Latent Class Analysis (LCA) of their self-reported sources of well-being. The study identified four distinct well-being profiles: Comfort-seeking, Nature-lov-ing, Mastery-oriented, and Playful. Play and peer relationships emerged as central across all groups, highlighting their foun-dational role in children’s daily happiness. Interestingly, gen-der and age shaped profile membership, with girls more often belonging to Nature-loving and Mastery-oriented groups, and

older children gravitating toward mastery-related accomplish-ments. Kindergarten type, however, showed no significant influ-ence. These findings highlight that there is no single pathway to happiness in early childhood, rather, multiple routes exist that must be supported through flexible, child-centered pedagogies and equitable policy design. As part of the same project a quan-titative study was conducted that applied psychological network analysis to data from young children to examine how different indicators of well-being interconnect. The results revealed that cheerful, lively, pride, and family and place satisfaction are the most influential nodes in the network, while friendship and sat-isfaction with me were the most peripheral components

Strengthening Regional Universities in Kazakhstan

ICEP RESEARCH UNCOVERS NEW INSIGHTS INTO INSTITU-TIONAL TRANSFORMATION AND FACULTY AGENCY
The International Collaborative Education Project (ICEP) con-tinues to advance understanding of the transformation of re-gional universities in Kazakhstan, generating new research on institutional change, faculty agency, leadership, and regional engagement. Several manuscripts are currently in develop-ment, each offering a unique perspective on how regional uni-versities navigate autonomy reforms and evolving missions within Kazakhstan’s higher education landscape.

FACULTY AGENCY AND AUTONOMY REFORMS
The forthcoming paper “Faculty Agency and Autonomy Re-forms in Kazakhstan’s Regional Universities” explores how faculty members perceive and enact their professional roles under autonomy-related reforms. Findings suggest that fac-ulty agency is a fluid and context-dependent process—both enabling and constraining. While autonomy expanded freedoms in areas such as curricu-lum design and resource generation, it also reproduced exist-ing bureaucratic dependencies and hierarchical inequalities. Faculty demonstrated agency most clearly in everyday prac-tices, including managing multiple roles and fostering collegial collaboration. Yet these efforts were often limited by institu-

tional control, resource shortages, and administrative rigidity. The study concludes that the empowering potential of auton-omy depends largely on leadership style, trust, and resource accessibility. Importantly, faculty members situate their work within regional development missions, aligning academic practices with local priorities.

CONSTRUCTING INSTITUTIONAL IDENTITY
The draft manuscript “Discursive Construction of Institutional Identity in Regional Universities: A Corpus-Based Comparison of Kazakhstani and U.S. University Websites” examines how univer-sities in different contexts use language to construct identity. Analysis revealed six dominant discourse formations educa-tional, institutional/management, political, marketing, eco-nomic, and social through which regional universities define themselves and negotiate power, legitimacy, and alignment with broader socio-political agendas.

While both Kazakhstani and U.S. institutions draw upon shared global discourses, they diverge in local expression:

- **Kazakhstani universities** emphasize state-embeddedness, regional development, and political legitimacy.
- **U.S. universities highlight** competitiveness, branding, eco-nomic impact, and community engagement.

This comparative study illustrates how global higher education narratives are locally adapted, showing that institutional identities are ultimately shaped by national power dynamics and ideological imperatives.

SENSEMAKING AND STRATEGIC LEADERSHIP

In “*Navigating Institutional Change: A Study of Dean Sensemaking and Strategic Response*,” ICEP researchers examine how deans interpret and respond to their universities’ new institutional statuses. The study finds that leaders engage in continuous sensemaking—interpreting ambiguous reforms through experience, dialogue, and collective meaning-making. A recurring theme is the creation of a new “regional identity.” Deans frame regional universities as both responsive to local needs and challenged by talent retention and resource limitations. This evolving identity balances institutional pride with strategic realism, bridging past prestige, present constraints, and future aspirations for global recognition.

OTHER NEWS PPE Project Articles Submitted to Q1 Journals

PPE PROJECT ARTICLES SUBMITTED TO LEADING Q1 JOURNALS

The **Positive Peace Education (PPE)** project team is pleased to announce the submission of two manuscripts to **high-impact Q1 journals**, reflecting ongoing efforts to expand the project’s international academic visibility.

1) “*Implementing Positive Peace Education in Schools: A Systematic Literature Review of Global Practices*” – re-submitted to Educational Research Review after incorporating peer reviewers’ feedback.



BOUNDARY-SPANNING AND REGIONAL ENGAGEMENT

Emerging findings from “*Boundary-Spanning as a Strategy for Reclaiming the Regional Engagement Mission in Higher Education*” highlight the diverse contributions of regional universities beyond academia. Their engagement with external stakeholders spans five domains: economic, social, cultural, technological, and ecological. Interviews with regional stakeholders illustrate how universities act as innovation anchors—supporting community development, fostering industry partnerships, and driving knowledge transfer across sectors.

BROADER IMPACT

Together, these studies underscore the **multifaceted transformation of Kazakhstan’s regional universities**. ICEP’s research reveals a dynamic ecosystem where **faculty agency, institutional identity, leadership sensemaking**, and **regional engagement** interact to shape the future of higher education in Kazakhstan.

2) “*The Fragile and Transformative Work of Implementing Positive Peace Education: Teachers’ Beliefs and Practices*” – submitted to the International Journal of Educational Research Open.

Both papers are currently under review. These submissions represent a significant milestone in advancing the global reach and scholarly contribution of the PPE project, positioning Nazarbayev University at the forefront of research on **values-based and peace-oriented education**.

Announcement: Upcoming Calls for Research Proposals (2026–2028)

The Ministry of Science and Higher Education of the Republic of Kazakhstan and Nazarbayev University are pleased to announce several research funding opportunities for the 2026–2028 period. Please find the details below.

Call for Young Researchers (Ministry of Science and Higher Education)

Duration: 2026–2028 (3 years)
Submission portal: is.ncste.kz

Key Dates

Submission opens: September 25, 2025
Internal deadline: October 18, 2025
Final deadline: October 25, 2025

Budget Limits

STEM: up to 30 million KZT per year
SSHM: up to 25 million KZT per year

Eligibility

- PI and all team members must be under 40 years old at the time of application
- PI must hold a PhD or Doctor in profile
- Previous awardees of Young Scientists’ competitions are not eligible as PI
- Current PIs of funded 2024–2026 or 2025–2027 projects are not eligible

Call documentation: available in Russian and Kazakh via is.ncste.kz

Call for Researchers (Ministry of Science and Higher Education)

Duration: 2026–2028 (3 years)
Submission portal: is.ncste.kz

Budget Limits

STEM: 2026: up to 30 million KZT/year
2027–2028: up to 40 million KZT/year
SSHM: 2026: up to 20 million KZT/year
2027–2028: up to 30 million KZT/year

Key Dates

Submission opens: October 6, 2025
Internal deadline: October 30, 2025
Final deadline: November 6, 2025

Eligibility

- PI must hold a PhD or Doctor in profile
- Current PIs of funded 2024–2026 or 2025–2027 projects are not eligible
- Call documentation: available in Russian (Kazakh and English versions accessible is.ncste.kz)

Nazarbayev University – Collaborative Research Program (CRP)

Duration: 2026–2028
Submission portal: [Pure system](https://pure.nu.edu.kz)

Key Dates

Submission period: September 9 – October 28, 2025 (11:00 AM, Astana time) for technical internal review
Final deadline: November 6, 2025 (11:00 AM, Astana time)
Documents and requirements: [NU website via this link](https://nu.edu.kz).

Nazarbayev University – Matching Research Program (MRP)

Duration: 2026–2028
Submission portal: [Pure system](https://pure.nu.edu.kz)

Key Dates

Submission period: September 9 – December 5, 2025 (11:00 AM, Astana time) for technical internal review
Final deadline: December 15, 2025 (11:00 AM, Astana time)

Documents and requirements: [NU website via this link](https://nu.edu.kz).

Nazarbayev University – Faculty Development Competitive Research Grant Program (FDCRGP)

Duration: 2026–2028
Submission portal: [Pure system](https://pure.nu.edu.kz)

Key Dates

Submission period: September 9 – October 13, 2025 (11:00 AM, Astana time) for technical internal review
Final deadline: October 23, 2025 (11:00 AM, Astana time)
Documents and requirements: [NU website via this link](https://nu.edu.kz).

Additional Information for Non-Residents

Applicants must obtain:

- Certificate of Tax Residency (requires 183+ days in Kazakhstan in the last 12 months and payment of taxes only in Kazakhstan)
- Electronic Digital Signature (EDS)

For assistance, please contact:

- Visa and Migration Support Coordinator – Maulen Yergaziyev: maulen.yergaziyev@nu.edu.kz

Pre-award Operations Office

Any questions related to research grants - preaward.nura@nu.edu.kz
albina.fairuzhanova@nu.edu.kz,

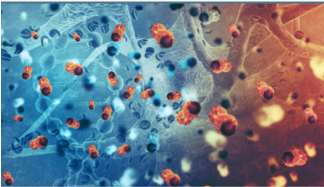
School Coordinators

SEDS: nazym.sailauova@nu.edu.kz
SSH: yertargyn.tleukenov@nu.edu.kz
NUSOM & SMG: sanam.israilova@nu.edu.kz
GSE, GSPP & GSB: balzhan.bolatbek@nu.edu.kz
Location: Block C4, 2nd floor, Office 265
+7 (7172) 69-48-27, 69-45-38, 69-47-19, 69-46-87

List of external research funding opportunities

We are pleased to share a curated list of international research funding opportunities that may be of interest to NU researchers. All listed opportunities have been pre-checked by Pre-award Operations Office of NURA and are open to applications from Nazarbayev University.

Pre-Award Operations Office Contacts:
Phone: +7 (7172) 69-48-27, 69-45-38, 69-47-19, 69-47-19
Office Location: Block C4, 2nd floor, Office 265

General 	Grant Program for Research and Development ¥500,000~¥2,000,000 – More details	30/11/2025	Mazak Foundation
	Catalyst grants More details	Rolling basis	The Catalyst Fund
	Wellcome Discovery Awards 700,000-8,000,000 GBP – More details	25/11/2025	Wellcome Trust
	Volvo environment prize €150,000 – More details	20/1/2026	Volvo
	Project Funding \$-not stated – More details	Rolling basis	Li Ka Shing Foundation
Economy and policy 	FID - Call for Proposals €50,000 - €6,250,000 – More details	Rolling basis	Fund for Innovation in Development
	PIER's Targeted Research Grant 2025 THB 400,000 – More details	30/11/2025	The Puey Ungphakorn Institute for Economic Research (PIER)
	Pro-active grants \$-not stated – More details	Rolling basis	Institute of Chartered Accountants of Scotland
Medicine 	Wellcome Career Development Awards £250,000 – More details	20/11/2025	Wellcome
	CSP Functional Genomics More details	29/1/2026	Joint Genome Institute (JGI)
	Focused Ultrasound Foundation Research Awards \$-not stated – More details	Rolling basis	Focused Ultrasound Foundation
	Research and education grants More details	Rolling basis	MedEvac Foundation International

Renewable energy



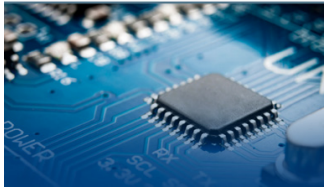
Engineering



STEM



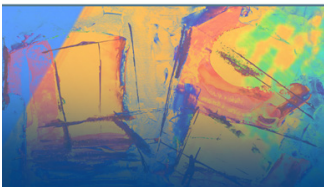
Computer science, AI



Archaeology



Science, art, culture



Grant application More details	Rolling basis	Energy Foundation
IDEA Programs (Innovations Deserving Exploratory Analysis): Rail Safety IDEA Up to \$130,000 for both Type 1 and Type 2 projects – More details	15/12/2025	Transportation Research Board (TRB) National Academies of Sciences, Engineering, and Medicine (NASEM)
Research and development enabling fund £25,000-£50,000 – More details	Rolling basis	Institution of Civil Engineers (ICE)
MSCA and Citizens: European Researchers' Night and Researchers at Schools 2026-2027 €100,000-300,000 – More details	22/10/2025	Horizon Europe
Targeted Grants in MPS \$-not stated – More details	Rolling basis	Simons Foundation
Research Ireland Discover Programme – Opportunistic Funding Mechanism More details	Rolling basis	The Science Foundation Ireland
Turing AI Pioneer Interdisciplinary Fellowships: outline applications as project co-lead (international) up to £2,187,500 – More details	14/10/2025	UKRI
Comcast Innovation Fund \$3,000 - \$150,000 – More details	Rolling basis	Comcast
Internet Freedom Fund \$10,000-\$900,000 – More details	Rolling basis	Open Technology Fund (OTF)
Ellen and Charles Steinmetz Endowment for Archaeology \$8,500 – More details	1/11/2025	Archaeological Institute of America (AIA)
Grants More details	Rolling basis	Jane ja Aatos Erkon Säätiö Jane and Aatos Erkkö Foundation

New Research Publications

Indexed by Scopus

July–September 2025

Between July and September 2025, Nazarbayev University researchers demonstrated strong publication activity across a wide range of disciplines, reflecting the university’s growing international presence and multidisciplinary research culture. Engineering, Social Sciences, Computer Science, and Materials Science remained the leading areas, with each field contributing significantly to NU’s visibility in Scopus-indexed journals. Notably, Medicine, Chemistry, and Physics & Astronomy also

showed consistent output, underscoring NU’s balance between STEM and Social Sciences. This quarter’s data highlight not only the strength of traditional engineering and materials research but also the increasing impact of publications in Environmental Science, Energy, and Multidisciplinary journals fields that directly contribute to addressing global challenges such as sustainability, climate change, and healthcare innovation.

1. Health & Medical Sciences

Dentistry, Neuroscience, Health Professions, Immunology and Microbiology, Medicine, Pharmacology, Toxicology and Pharmaceutics, Nursing.
Research in health and medical sciences at NU spans clinical medicine, public health, neuroscience, and pharmaceutical studies. Publications highlight innovative approaches to disease prevention, diagnostics, and treatment, while also advancing nursing practice and healthcare delivery. This body of work strengthens NU’s contribution to addressing national and global health challenges.

- **Global, Regional, and National Burden of Nontraumatic Subarachnoid Hemorrhage The Global Burden of Disease Study 2021**
JAMA Neurology
DOI: 10.1001/jamaneurol.2025.1522
- **Association Between Work Status and Quality of Life in End-Stage Renal Disease Patients During the First Year of Hemodialysis**
Hemodialysis International
DOI: 10.1111/hdi.13221
- **Energy transition governance in an emerging economy: opportunities and threats on the road to a sustainable future in Kazakhstan**
Environmental Research Letters
DOI: 10.1088/1748-9326/addd37
- **Power Prism framework for health advocacy: A case of dietary supplements for weight loss and muscle building sold to youth in Massachusetts municipalities**
Electronic Journal of General Medicine
DOI: 10.29333/ejgm/16371

- **Tunable oil-water separation using engineered cellulose membranes**
Chemosphere
DOI: 10.1016/j.chemosphere.2025.144319
- **Advanced digital image forensics: A hybrid framework for copy-move forgery detection in multimedia security**
Journal of Forensic Sciences
DOI: 10.1111/1556-4029.70076
- **Deep learning based time-dependent reliability analysis of an underactuated lower-limb robot exoskeleton for gait rehabilitation**
Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine
DOI: 10.1177/09544119251349362
- **Evaluation of clinical usability and reproducibility of the American Society for Reproductive Medicine Müllerian Anomalies Classification**
European Journal of Obstetrics and Gynecology and Reproductive Biology: X
DOI: 10.1016/j.eurox.2025.100425
- **Disrupted Vaginal Microbiota and Increased HPV Infection Risk Among Non-Vaccinated Women: Findings from a Prospective Cohort Study in Kazakhstan**
Vaccines
DOI: 10.3390/vaccines13070679
- **Metagenomic Characterization of Gut Microbiota in Individuals with Low Cardiovascular Risk**
Journal of Clinical Medicine
DOI: 10.3390/jcm14145097

- **Selective Cyclooxygenase-2 Inhibitors in Preclinical Rodent Models of Depression and Post-traumatic Stress Disorder: A Systematic Review of Behavioral, Neuroinflammatory, and Molecular Mechanisms**
ACS Chemical Neuroscience
DOI: 10.1021/acscchemneuro.5c00568
- **Synthesis, Structure and Cytoprotective Activity of New Derivatives of 4-Aryl-3-Aminopyridin-2(1H)-One**
Molecules
DOI: 10.3390/molecules30163331
- **Escherichia Abundance and Metabolism Align with Vitiligo Disease Activity**
Journal of Investigative Dermatology
DOI: 10.1016/j.jid.2025.01.032
- **Multidrug-Resistant Tuberculosis in Central Asia and Predominant Beijing Lineage, Challenges in Diagnosis, Treatment Barriers, and Infection Control Strategies: An Integrative Review**
Antibiotics
DOI: 10.3390/antibiotics14070673
- **Whole-Genome Sequencing of a Potentially Novel Aeromonas Species Isolated from Diseased Siberian Sturgeon (Acipenser baerii) Using Oxford Nanopore Sequencing**
Microorganisms
DOI: 10.3390/microorganisms13071680
- **Utilization of SiO2 Nanoparticles in Developing Superhydrophobic Coatings for Road Construction: A Short Review**
Molecules
DOI: 10.3390/molecules30132705
- **Assessing Quality of Life in Hemodialysis Patients in Kazakhstan: A Cross-Sectional Study**
Journal of Clinical Medicine
DOI: 10.3390/jcm14145021
- **‘You have no face – so you have no eyes’: Experiences of women with visual impairments in Ileni Mwiitaleleko centre of Namibia**
British Journal of Visual Impairment
DOI: 10.1177/02646196241269601
- **The informativeness of the gradient revisited**
Neural Networks
DOI: 10.1016/j.neunet.2025.107517
- **Impact of Exercise Therapy on Outcomes in Patients with Low Back Pain: An Umbrella Review of Systematic Reviews**
Journal of Clinical Medicine
DOI: 10.3390/jcm14175942
- **Heatwave-Induced Thermal Stratification Shaping Microbial-Algal Communities Under Different Climate Scenarios as Revealed by Long-Read Sequencing and Imaging Flow Cytometry**
Toxins
DOI: 10.3390/toxins17080370

- **Ethnic Variation in Lipoprotein(a) Levels in the Kazakhstan Population**
Journal of Clinical Medicine
DOI: 10.3390/jcm14176336
- **Long-Term Limiting Illness in the United Kingdom: Before and After the Covid Lockdown**
International Journal of Health Planning and Management
DOI: 10.1002/hpm.3920
- **UYSD: a novel data repository accessible via public website for worldwide population frequencies of Y-SNP haplogroups**
European Journal of Human Genetics
DOI: 10.1038/s41431-025-01854-5
- **Advancing Gait Rehabilitation: A Systematic Review of Robotic Exoskeletons for Cerebral Palsy**
Wearable Technologies
DOI: 10.1017/wtc.2025.10027
- **The Evolving Role of Chemotherapy in the Management of Pleural Malignancies: Current Evidence and Future Directions**
Cancers
DOI: 10.3390/cancers17132143
- **Dynamics of immunological parameters depending on pregravid preparation in women of fertile age with antiphospholipid syndrome: An observation research**
Reproductive Medicine (Central Asia)
DOI: 10.37800/RM.2.2025.478
- **Mobilizing for Health: A Case Study of Kazakhstan’s Vaping Ban Advocacy Campaign**
International Journal of Environmental Research and Public Health
DOI: 10.3390/ijerph22071102
- **Efficient active learning using recursive estimation of error reduction**
Neurocomputing
DOI: 10.1016/j.neucom.2025.130131
- **Light controllable smart Poly(ADP-ribose) polymerase-1 inhibitor delivery by sustainable green materials for regulation of cytotoxicity**
Journal of Drug Delivery Science and Technology
DOI: 10.1016/j.jddst.2025.107036
- **The significance of brain-derived neurotrophic factor (BDNF) in pregnancy pathology: A literature review**
Reproductive Medicine (Central Asia)
DOI: 10.37800/RM.2.2025.466
- **Epidemiological trends of idiopathic epilepsy in Central Asia: Insights from the global burden of disease study (1990–2021)**
Seizure
DOI: 10.1016/j.seizure.2025.07.013
- **The interplay involving oxidative stress and autophagy: Mechanisms, implications, and therapeutic opportunities**

Experimental and Molecular Pathology
DOI:10.1016/j.yexmp.2025.104989

- **Zebrafish as a Model Organism for Post-Traumatic Stress Disorder: Insights into Stress Mechanisms and Behavioral Assays**
Biology
DOI: 10.3390/biology14080939
- **Indirect Myocardial Injury in Polytrauma: Mechanistic Pathways and the Clinical Utility of Immunological Markers**
Journal of Cardiovascular Development and Disease
DOI: 10.3390/jcdd12070268
- **Psychometric validation of Filipino versions of the survey of attitudes toward statistics and attitudes toward research for nursing students**
Jurnal Ners
DOI: 10.20473/jn.v20i3.67728
- **Bioactive Dioxo-Phosphobetaines derived from the reaction of Dichlorodinitrobenzofuroxane with various phosphines**
Bioorganic Chemistry
DOI: 10.1016/j.bioorg.2025.108695
- **An Integrated Strategy for Preventing and Rehabilitating Dust-Induced Occupational Bronchopulmonary Diseases: A Scoping Review**
Advances in Respiratory Medicine
DOI: 10.3390/arm93040030
- **Effects of Intense Physical Training on Left Ventricular Hemodynamic Forces in Endurance Athletes: A Feature-Tracking Cardiac Magnetic Resonance Study**
Medicine and Science in Sports and Exercise
DOI: 10.1249/MSS.0000000000003703
- **Epidemiological Insights into Colorectal Cancer Survival in Kazakhstan (2014–2023): A Retrospective Analysis Using the National Electronic Registry of Oncological Patients**
Cancers
DOI: 10.3390/cancers17142336
- **The Implementation of Antimicrobial Consumption Surveillance and Stewardship in Human Healthcare in Post-Soviet States: A Systematic Review**
Antibiotics
DOI: 10.3390/antibiotics14080749
- **The Incidence, Mortality, and Survival Trends of Pancreatic Cancer in Kazakhstan: Data from the National Electronic Registry of Oncological Patients (2014–2023)**
Cancers
DOI: 10.3390/cancers17142277
- **Intracranial aneurysms and delayed cerebral ischemia: Decades of evidence on unexplored event**
Electronic Journal of General Medicine
DOI: 10.29333/ejgm/16517

2. Biochemistry, Genetics & Molecular Biology

This area covers fundamental studies in molecular processes, genomics, and biotechnology. NU publications demonstrate advances in genetic analysis, molecular medicine, and biocompatible materials, reflecting strong links between life sciences and translational applications.

- **CRISPR revolution: Unleashing precision pathogen detection to safeguard public health and food safety**
Methods
DOI: 10.1016/j.ymeth.2025.04.018
- **Quantum Dot-Based Luminescent Sensors: Review from Analytical Perspective**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26146674
- **Synthesis, Structure and Cytoprotective Activity of New Derivatives of 4-Aryl-3-Aminopyridin-2(1H)-One**
Molecules
DOI: 10.3390/molecules30163331
- **Escherichia Abundance and Metabolism Align with Vitiligo Disease Activity**
Journal of Investigative Dermatology
DOI: 10.1016/j.jid.2025.01.032
- **Multidrug-Resistant Tuberculosis in Central Asia and Predominant Beijing Lineage, Challenges in Diagnosis, Treatment Barriers, and Infection Control Strategies: An Integrative Review**
Antibiotics
DOI: 10.3390/antibiotics14070673
- **Composite Metal Oxide Nanopowder-Based Fiber-Optic Fabry–Perot Interferometer for Protein Biomarker Detection**
Biosensors
DOI: 10.3390/bios15070449
- **How Actin Polymerization and Myosin II Activity Regulate Focal Adhesion Dynamics in Motile Cells**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26167701
- **Utilization of SiO2 Nanoparticles in Developing Superhydrophobic Coatings for Road Construction: A Short Review**
Molecules
DOI: 10.3390/molecules30132705
- **Selective Cyclooxygenase-2 Inhibitors in Preclinical Rodent Models of Depression and Post-traumatic Stress Disorder: A Systematic Review of Behavioral, Neuroinflammatory, and Molecular Mechanisms**
ACS Chemical Neuroscience
DOI: 10.1021/acscchemneuro.5c00568
- **Distinctive Effects of Fullerene C60 and Fullerenol C60(OH)24 Nanoparticles on Histological, Molecular and Behavioral Hallmarks of Alzheimer’s Disease in**

APPswe/PS1E9 Mice
Antioxidants
DOI: 10.3390/antiox14070834

- **Longitudinal Myocardial Deformation as an Emerging Biomarker for Post-Traumatic Cardiac Dysfunction**
Life
DOI: 10.3390/life15071052
- **Neuro-Cells Mitigate Amyloid Plaque Formation and Behavioral Deficits in the APPswe/PS1dE9 Model of Alzheimer Disease While Also Reducing IL-6 Production in Human Monocytes**
Cells
DOI: 10.3390/cells14151168
- **Quantitative Alterations in Short-Chain Fatty Acids in Inflammatory Bowel Disease: A Systematic Review and Meta-Analysis**
Biomolecules
DOI: 10.3390/biom15071017
- **A Biophysics of Epigenetic Rejuvenation**
Cells
DOI: 10.3390/cells14161249
- **A three-dimensional micropillar electrode array-based microfluidic sensor for sensitive and stable voltammetric detection of phosphate**
Analyst
DOI: 10.1039/d5an00377f
- **UYSD: a novel data repository accessible via public website for worldwide population frequencies of Y-SNP haplogroups**
European Journal of Human Genetics
DOI: 10.1038/s41431-025-01854-5
- **The interplay involving oxidative stress and autophagy: Mechanisms, implications, and therapeutic opportunities**
Experimental and Molecular Pathology
DOI: 10.1016/j.yexmp.2025.104989
- **Bioactive Dioxo-Phosphobetaines derived from the reaction of Dichlorodinitrobenzofuroxane with various phosphines**
Bioorganic Chemistry
DOI: 10.1016/j.bioorg.2025.108695
- **The Evolving Role of Chemotherapy in the Management of Pleural Malignancies: Current Evidence and Future Directions**
Cancers
DOI: 10.3390/cancers17132143
- **Therapeutic Effects of Neuro-Cells on Amyloid Pathology, BDNF Levels, and Insulin Signalling in APPswe/PSd1E9 Mice**
Cells
DOI: 10.3390/cells14161293
- **Effects of n-Myc and c-Myc on the expression of p53 family members and their transcriptional targets in**

human neuroblastoma cells
Biochemical and Biophysical Research Communications
DOI: 10.1016/j.bbrc.2025.151944

- **Streptomycin-modified magnetic beads enable robust DNA extraction across diverse lysis conditions**
Analytical Biochemistry
DOI: 10.1016/j.ab.2025.115836
- **Zebrafish as a Model Organism for Post-Traumatic Stress Disorder: Insights into Stress Mechanisms and Behavioral Assays**
Biology
DOI: 10.3390/biology14080939
- **The Incidence, Mortality, and Survival Trends of Pancreatic Cancer in Kazakhstan: Data from the National Electronic Registry of Oncological Patients (2014–2023)**
Cancers
DOI: 10.3390/cancers17142277
- **Epidemiological Insights into Colorectal Cancer Survival in Kazakhstan (2014–2023): A Retrospective Analysis Using the National Electronic Registry of Oncological Patients**
Cancers
DOI: 10.3390/cancers17142336
- **Site-Specific Gut Microbiome Changes After Roux-en-Y Gastric Bypass in Rats: Effects of a Multicomponent Bovine Colostrum-Based Complex**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26157186
- **DNA and Histone Modifications Identify a Putative Controlling Element (CE) on the X Chromosome of Sciar a coprophila**
Cells
DOI: 10.3390/cells14161243
- **The Implementation of Antimicrobial Consumption Surveillance and Stewardship in Human Healthcare in Post-Soviet States: A Systematic Review**
Antibiotics
DOI: 10.3390/antibiotics14080749

3. Chemistry & Chemical Engineering

NU researchers actively publish in chemistry and chemical engineering, focusing on catalysis, nanostructured polymers, green chemistry, and reaction engineering. These works support innovation in pharmaceuticals, energy conversion, and sustainable materials processing.

- **Unveiling the future of supercapacitors: Integrating metal–organic frameworks for superior energy storage**
Journal of Industrial and Engineering Chemistry
DOI: 10.1016/j.jiec.2025.04.016
- **Design of an event-triggered extended dissipative state estimator for neural networks with multiple time-varying delays**

European Physical Journal: Special Topics
DOI: 10.1140/epjs/s11734-024-01240-0

- **Enhanced desulfurization Pervaporate via tailored Polypyrrolidone membranes with functionalized graphene oxide nanoparticles and silver ions**
Separation and Purification Technology
DOI: 10.1016/j.seppur.2025.132562
- **Dual-functional tannic acid-infused AgNPs-PVDF membranes via coagulation methods: an integrated study on antibacterial and antifouling performances for oil-in-water separation**
Materials Advances
DOI: 10.1039/d5ma00355e
- **Sustainable biowaste-derived carbon aerogel/MXene composite for mercury removal from water**
Materials Today Sustainability
DOI: 10.1016/j.mtsust.2025.101132
- **Self-driven charge transfer mechanism of Bi NPs/PCN-224 for enhanced photodynamic antimicrobial chemotherapy effect**
Journal of Colloid and Interface Science
DOI: 10.1016/j.jcis.2025.02.215
- **Aggregation-Caused quenching or Aggregation-Induced (Enhanced) Emission? The Decisive role of aggregation in solvents and their mixtures**
Journal of Molecular Liquids
DOI: 10.1016/j.molliq.2025.127901
- **Aqueous two-phase emulsion systems in 3D cell culture**
Current Opinion in Colloid and Interface Science
DOI: 10.1016/j.cocis.2025.101933
- **Machine Learning Prediction of CO2 Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions**
Applied Sciences (Switzerland)
DOI: 10.3390/app15158536
- **Quantum Dot-Based Luminescent Sensors: Review from Analytical Perspective**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26146674
- **Synthesis, Structure and Cytoprotective Activity of New Derivatives of 4-Aryl-3-Aminopyridin-2(1H)-One**
Molecules
DOI: 10.3390/molecules30163331
- **Efficient Photocatalytic Degradation of Tetracycline by S-Type Heterojunction BiOBr/h-MoO3 With Oxygen-Rich Vacancies Under Visible Light**
Applied Organometallic Chemistry
DOI: 10.1002/aoc.70356
- **Composite Metal Oxide Nanopowder-Based Fiber-Optic Fabry–Perot Interferometer for Protein Biomarker Detection**
Biosensors
DOI: 10.3390/bios15070449
- **Mechanistic insights into glucose-to-5-HMF conversion in DES media**

Journal of Molecular Liquids
DOI: 10.1016/j.molliq.2025.127774

- **Efficient production of ultrafine poly-p-phenylene benzobisoxazole nanofibres for high-performance polyurea nanocomposites**
Progress in Organic Coatings
DOI: 10.1016/j.porgcoat.2025.109301
- **Retraction: The behavior of Ni nanotubes under the influence of environments with different acidities (CrystEngComm (2018) 20 (3258–3266) DOI: 10.1039/C8CE00362A)**
CrystEngComm
DOI: 10.1039/d5ce90099a
- **How Actin Polymerization and Myosin II Activity Regulate Focal Adhesion Dynamics in Motile Cells**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26167701
- **Utilization of SiO2 Nanoparticles in Developing Superhydrophobic Coatings for Road Construction: A Short Review**
Molecules
DOI: 10.3390/molecules30132705
- **Corrigendum to “The effect of two critical operating factors on the enhanced catalytic conversion of aqueous NO3– to NH4+ by Pt-Co@NC and theoretical verification of its surface reaction mechanism” [Chem. Eng. J. 506 (2025) 159874] (Chemical Engineering Journal (2025) 506, (S1385894725006734), (10.1016/j.cej.2025.159874))**
Chemical Engineering Journal
DOI: 10.1016/j.cej.2025.163733
- **Perovskite Solar Cells Modified with Conjugated Self-Assembled Monolayers at Buried Interfaces**
Nanomaterials
DOI: 10.3390/nano15131014
- **Photocatalytic optimization of ZnO-Ga2O3 composite thin films for PEC water splitting: effects of thickness, environment, and annealing temperature**
RSC Advances
DOI: 10.1039/d5ra03463a
- **A three-dimensional micropillar electrode array-based microfluidic sensor for sensitive and stable voltammetric detection of phosphate**
Analyst
DOI: 10.1039/d5an00377f
- **Designing Imidazolium-Mediated Polymer Electrolytes for Lithium-Ion Batteries Using Machine-Learning Approaches: An Insight into Ionene Materials**
Polymers
DOI: 10.3390/polym17152148
- **Advances of Ionic-Mediated Polymer Architectures for CO2 Gas Separation Membranes: A Comprehensive Review of Design, Progress, and Future Prospects**
ACS Omega
DOI: 10.1021/acsomega.5c03166
- **Bioactive Dioxo-Phosphobetaines derived from the**

reaction of Dichlorodinitrobenzofuroxane with various phosphines
Bioorganic Chemistry
DOI: 10.1016/j.bioorg.2025.108695

- **Dual surface functionalised curcumin-shellac nano-delivery system with enhanced antimicrobial action**
RSC Advances
DOI: 10.1039/d5ra03212a
- **Hierarchical porous adsorbent from asphaltenes fibers and its application for methyl orange removal**
RSC Advances
DOI: 10.1039/d5ra03061g
- **Tunable oil-water separation using engineered cellulose membranes**
Chemosphere
DOI: 10.1016/j.chemosphere.2025.144319
- **Homogeneous Base-Metal-Catalyzed Transfer Hydrogenation of Unsaturated N-Containing Organic Compounds**
ChemCatChem
DOI: 10.1002/cctc.202500702
- **Concomitant generation of hydrogen during carbon dioxide storage in ultramafic massifs- state of the art with implications to decarbonization strategies**
Carbon Capture Science and Technology
DOI: 10.1016/j.ccst.2025.100481
- **Superhydrophobic and Anti-Icing Coatings on Asphalt Pavements: A Review**
ACS Omega
DOI: 10.1021/acsomega.5c04031
- **Boosting the Photoelectrochemical Activity of TiO2-Au Films by Harvesting Infrared Photons with a Li-Codoped NaYF4:Yb,Er Upconversion Layer**
ACS Applied Optical Materials
DOI: 10.1021/acsaom.5c00139
- **Optimizing nitrogen doping strategies in hard carbon for enhanced performance in sodium-ion batteries**
Carbon Trends
DOI: 10.1016/j.cartre.2025.100523
- **Site-Specific Gut Microbiome Changes After Roux-en-Y Gastric Bypass in Rats: Effects of a Multicomponent Bovine Colostrum-Based Complex**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26157186

4. Computer Science

Computer science publications emphasize artificial intelligence, machine learning, data science, and cybersecurity. NU researchers contribute to both theoretical advances and applied solutions for digital transformation, smart cities, and technological innovation.

- **An exploratory user study towards developing a unified, comprehensive assessment apparatus for deaf signers, specifically tailored for signing avatars evaluation: challenges, findings, and recommendations**

Multimedia Tools and Applications
DOI: 10.1007/s11042-024-20365-x

- **AddManBERT: A combinatorial triples extraction and classification task for establishing a knowledge graph to facilitate design for additive manufacturing**
Advanced Engineering Informatics
DOI: 10.1016/j.aei.2025.103578
- **Machine Learning Prediction of CO2 Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions**
Applied Sciences (Switzerland)
DOI: 10.3390/app15158536
- **Quantum Dot-Based Luminescent Sensors: Review from Analytical Perspective**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26146674
- **Advancing Intermediate Soil Properties (ISP) Interpolation for Enhanced Geotechnical Survey Accuracy. A Review**
Engineering Reports
DOI: 10.1002/eng2.70328
- **How Actin Polymerization and Myosin II Activity Regulate Focal Adhesion Dynamics in Motile Cells**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26167701
- **Energy-efficient offloading framework for mobile edge/cloud computing based on convex optimization and Deep Q-Network**
Journal of Supercomputing
DOI: 10.1007/s11227-025-07647-3
- **Tailoring digital transformation: A customized DESI framework for economic and societal growth**
Telematics and Informatics Reports
DOI: 10.1016/j.teler.2025.100244
- **The informativeness of the gradient revisited**
Neural Networks
DOI: 10.1016/j.neunet.2025.107517
- **Multimodal multimedia information retrieval through the integration of fuzzy clustering, OWA-based fusion, and Siamese neural networks**
Fuzzy Sets and Systems
DOI: 10.1016/j.fss.2025.109419
- **Efficient active learning using recursive estimation of error reduction**
Neurocomputing
DOI: 10.1016/j.neucom.2025.130131
- **Fine-Tuning Methods and Dataset Structures for Multilingual Neural Machine Translation: A Kazakh–English–Russian Case Study in the IT Domain**
Electronics (Switzerland)
DOI: 10.3390/electronics14153126
- **Site-Specific Gut Microbiome Changes After Roux-en-Y Gastric Bypass in Rats: Effects of a Multicomponent Bovine Colostrum-Based Complex**
International Journal of Molecular Sciences
DOI: 10.3390/ijms26157186

- **Tiny deep learning model for insect segmentation and counting on resource-constrained devices**
Computers and Electronics in Agriculture
DOI: 10.1016/j.compag.2025.110378
- **Natural fracture network model using Gaussian simulation and machine learning algorithms**
Applied Computing and Geosciences
DOI: 10.1016/j.acags.2025.100258
- **A non-computable c.e. closed subset of [0, 1]**
Journal of Logic and Computation
DOI: 10.1093/logcom/exaf043

5. Economics & Business

Publications in economics, finance, and business management provide data-driven insights into global and regional economic development. NU research explores markets, organizational behavior, and financial systems, offering evidence for policy and industry decision-making.

- **Higher Education Leadership Agency in Mainstreaming Gender Equality: Insights From Universities in Kazakhstan**
Gender, Work and Organization
DOI: 10.1111/gwao.13239
- **Spinning the circle: unravelling the “why?” behind social motivations in circular economy entrepreneurship**
Journal of Enterprising Communities
DOI: 10.1108/JEC-01-2024-0003
- **Leveraging the Shift in the Geocultural Landscape Towards Internationalizing Cultural Entrepreneurship**
FIIB Business Review
DOI: 10.1177/23197145251313833
- **A global value chain approach to economic diversification and resilience in resource-rich states: the case of Kazakhstan**
Journal of International Business Policy
DOI: 10.1057/s42214-025-00220-y
- **Negative nominal rates**
Journal of Financial Stability
DOI: 10.1016/j.jfs.2025.101437
- **Measuring energy poverty by estimating the income elasticity of energy demand: An application to Kazakhstan**
Utilities Policy
DOI: 10.1016/j.jup.2025.101901
- **The innovation capability equation: A systematic review of global determinants of SME’s success**
Journal of Innovation and Knowledge
DOI: 10.1016/j.jik.2025.100757

6. Energy

Energy publications focus on renewable resources, energy storage, hydrogen technologies, and sustainable fuel production. NU research in this field contributes to Kazakhstan’s energy transition and supports international climate goals.

- **Sustainable biowaste-derived carbon aerogel/MXene**

- **composite for mercury removal from water**
Materials Today Sustainability
DOI: 10.1016/j.mtsust.2025.101132
- **Pore structure alteration in heated granite after LN2 treatment: An experimental study for the enhanced geothermal energy extraction**
Geothermics
DOI: 10.1016/j.geothermics.2025.103326
- **Breaking new ground: A first-of-its-kind critical analysis of review articles on phase change materials for building applications**
Applied Energy
DOI: 10.1016/j.apenergy.2025.125984
- **Energy transition governance in an emerging economy: opportunities and threats on the road to a sustainable future in Kazakhstan**
Environmental Research Letters
DOI: 10.1088/1748-9326/add37
- **Measuring energy poverty by estimating the income elasticity of energy demand: An application to Kazakhstan**
Utilities Policy
DOI: 10.1016/j.jup.2025.101901
- **Pore structure analysis by mercury intrusion and nitrogen adsorption after LN2 treatment: An experimental study for granite rocks in ‘O’ field, Kazakhstan**
Geoenergy Science and Engineering
DOI: 10.1016/j.geoen.2025.213953
- **Sustainable isolation of cellulose nanofibers with superior crystallinity and thermal stability from Terminalia catappa L. fruit peel waste**
Biomass Conversion and Biorefinery
DOI: 10.1007/s13399-025-06726-y
- **High Fidelity 2-Way Dynamic Fluid-Structure-Interaction (FSI) Simulation of Wind Turbines Based on Arbitrary Hybrid Turbulence Model (AHTM)**
Energies
DOI: 10.3390/en18164401
- **Concomitant generation of hydrogen during carbon dioxide storage in ultramafic massifs- state of the art with implications to decarbonization strategies**
Carbon Capture Science and Technology
DOI: 10.1016/j.ccst.2025.100481

7. Engineering

Engineering is NU’s largest publication area, covering mechanical, civil, electrical, and chemical disciplines. Studies highlight robotics, infrastructure development, industrial optimization, and advanced technologies, demonstrating the university’s strong applied research capacity.

- **Experimental investigation of ANFIS-PSO MPPT control with enriched voltage gain DC–DC converter for grid-tied PV applications**
Electrical Engineering
DOI: 10.1007/s00202-023-02192-9
- **Continuous flow synthesis of furfural from biomass-de-**

- **rived waste using a ZnCl2/NaCl catalytic system**
Results in Engineering
DOI: 10.1016/j.rineng.2025.105680
- **An exploratory user study towards developing a unified, comprehensive assessment apparatus for deaf signers, specifically tailored for signing avatars evaluation: challenges, findings, and recommendations**
Multimedia Tools and Applications
DOI: 10.1007/s11042-024-20365-x
- **Breaking new ground: A first-of-its-kind critical analysis of review articles on phase change materials for building applications**
Applied Energy
DOI: 10.1016/j.apenergy.2025.125984
- **Innovative Large-Scale Building Specimen Designs to Maximize Shake Table Testing Outcomes**
Earthquake Engineering and Structural Dynamics
DOI: 10.1002/eqe.4366
- **Investigating die-sinking EDM drilling performance on additively manufactured SS316L steel lattice structures**
Manufacturing Letters
DOI: 10.1016/j.mfglet.2025.06.076
- **Effect of shot peening on the cavitation erosion of manganese aluminium bronze alloy: Microstructural and morphological insights**
Materials Letters
DOI: 10.1016/j.matlet.2025.138659
- **Comparison study of Selective Laser melted Ti6Al4V and Ti6Al4V-8Ta Alloys: Mechanical & corrosion properties**
Manufacturing Letters
DOI: 10.1016/j.mfglet.2025.06.095
- **Machine Learning Prediction of CO2 Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions**
Applied Sciences (Switzerland)
DOI: 10.3390/app15158536
- **Composite Metal Oxide Nanopowder-Based Fiber-Optic Fabry–Perot Interferometer for Protein Biomarker Detection**
Biosensors
DOI: 10.3390/bios15070449
- **Advancing Intermediate Soil Properties (ISP) Interpolation for Enhanced Geotechnical Survey Accuracy. A Review**
Engineering Reports
DOI: 10.1002/eng2.70328
- **Tailoring digital transformation: A customized DESI framework for economic and societal growth**
Telematics and Informatics Reports
DOI: 10.1016/j.teler.2025.100244
- **Deep learning based time-dependent reliability analysis of an underactuated lower-limb robot exoskeleton for gait rehabilitation**
Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine
DOI: 10.1177/09544119251349362

- **Optimizing Energy Performance of Phase-Change Material-Enhanced Building Envelopes Through Novel Performance Indicators**
Buildings
DOI: 10.3390/buildings15152678
- **RETRACTED: A Comparative Study of the Rheological Properties of a Fly Ash-Based Geopolymer Reinforced with PP Fiber for 3D Printing: An Experimental and Numerical Approach (Buildings, (2024), 14, 7, (2068), 10.3390/buildings14072068)**
Buildings
DOI: 10.3390/buildings15152788
- **Corrigendum to “The effect of two critical operating factors on the enhanced catalytic conversion of aqueous NO3– to NH4+ by Pt-Co@NC and theoretical verification of its surface reaction mechanism” [Chem. Eng. J. 506 (2025) 159874] (Chemical Engineering Journal (2025) 506, (S1385894725006734), (10.1016/j.cej.2025.159874))**
Chemical Engineering Journal
DOI: 10.1016/j.cej.2025.163733
- **Critical Thiele Modulus for Diffusion-Reaction Problems in Catalyst Slabs With Generalized Langmuir-Hinshelwood Kinetics**
Mathematical Methods in the Applied Sciences
DOI: 10.1002/mma.11138
- **Process and Composition Parameter Optimization of Friction Stir Process of AA 6101 Aluminum Composites using Response Surface Methodology**
Metals and Materials International
DOI: 10.1007/s12540-025-01901-2
- **Advancements of carbon nanomaterials-modified asphalt: Processes, properties, economic feasibility and future perspectives**
Journal of Traffic and Transportation Engineering (English Edition)
DOI: 10.1016/j.jtte.2024.10.002
- **Definition and classification of rockburst**
Rock Mechanics Bulletin
DOI: 10.1016/j.rockmb.2025.100206
- **Fine-Tuning Methods and Dataset Structures for Multilingual Neural Machine Translation: A Kazakh–English–Russian Case Study in the IT Domain**
Electronics (Switzerland)
DOI: 10.3390/electronics14153126
- **High Fidelity 2-Way Dynamic Fluid-Structure-Interaction (FSI) Simulation of Wind Turbines Based on Arbitrary Hybrid Turbulence Model (AHTM)**
Energies
DOI: 10.3390/en18164401
- **OTDR signature of polymer optical fiber for deformation monitoring**
Measurement: Journal of the International Measurement Confederation
DOI: 10.1016/j.measurement.2025.117757

8. Environmental Science

Environmental science research addresses climate change, pollution, water treatment, and sustainable resource management. NU publications propose practical solutions for environmental protection and resilience in Kazakhstan and beyond.

- **Breaking new ground: A first-of-its-kind critical analysis of review articles on phase change materials for building applications**
Applied Energy
DOI: 10.1016/j.apenergy.2025.125984
- **Energy transition governance in an emerging economy: opportunities and threats on the road to a sustainable future in Kazakhstan**
Environmental Research Letters
DOI: 10.1088/1748-9326/addd37
- **Enhanced remediation of diesel-contaminated soils using a novel biopolymer-based emulsion**
Journal of Hazardous Materials
DOI: 10.1016/j.jhazmat.2025.138183
- **Lowland transboundary river in a cold, semi-arid steppe: review of the Yesil River basin**
Environmental Earth Sciences
DOI: 10.1007/s12665-025-12500-0
- **Investigating clay swelling and permeability impairment in sandstone formations during steam flooding**
Clays and Clay Minerals
DOI: 10.1017/cmn.2025.10008
- **Heatwave-Induced Thermal Stratification Shaping Microbial-Algal Communities Under Different Climate Scenarios as Revealed by Long-Read Sequencing and Imaging Flow Cytometry**
Toxins
DOI: 10.3390/toxins17080370
- **Corrigendum to “The effect of two critical operating factors on the enhanced catalytic conversion of aqueous NO3– to NH4+ by Pt-Co@NC and theoretical verification of its surface reaction mechanism” [Chem. Eng. J. 506 (2025) 159874] (Chemical Engineering Journal (2025) 506, (S1385894725006734), (10.1016/j.cej.2025.159874))**
Chemical Engineering Journal
DOI: 10.1016/j.cej.2025.163733
- **A three-dimensional micropillar electrode array-based microfluidic sensor for sensitive and stable voltammetric detection of phosphate**
Analyst
DOI: 10.1039/d5an00377f
- **Mobilizing for Health: A Case Study of Kazakhstan’s Vaping Ban Advocacy Campaign**
International Journal of Environmental Research and Public Health
DOI: 10.3390/ijerph22071102
- **Tunable oil-water separation using engineered cellulose membranes**
Chemosphere

DOI: 10.1016/j.chemosphere.2025.144319

- **Cost-effectiveness of regenerated green materials for removal of pharmaceuticals from wastewater**
Waste Management
DOI: 10.1016/j.wasman.2025.114952
- **Concomitant generation of hydrogen during carbon dioxide storage in ultramafic massifs- state of the art with implications to decarbonization strategies**
Carbon Capture Science and Technology
DOI: 10.1016/j.ccst.2025.100481
-

9. Materials Science

Materials science remains one of NU’s strongest publication domains, focusing on nanomaterials, functional coatings, smart membranes, and energy devices. Research advances next-generation functional materials that support clean energy, sustainability, and healthcare technologies.

- **Synthesis, Characterization, and Analysis of Bioplasti-cizers Derived from Thespesia populnea Leaf: Towards Sustainable Biomaterials**
Journal of Inorganic and Organometallic Polymers and Materials
DOI: 10.1007/s10904-025-03609-7
- **Fabrication of mechanically resistant ZnO-based super-hydrophobic material for enhanced concrete applications**
Case Studies in Construction Materials
DOI: 10.1016/j.cscm.2025.e04655
- **Design of an event-triggered extended dissipative state estimator for neural networks with multiple time-varying delays**
European Physical Journal: Special Topics
DOI: 10.1140/epjs/s11734-024-01240-0
- **Dual-functional tannic acid-infused AgNPs-PVDF membranes via coagulation methods: an integrated study on antibacterial and antifouling performances for oil-in-water separation**
Materials Advances
DOI: 10.1039/d5ma00355e
- **Sustainable biowaste-derived carbon aerogel/MXene composite for mercury removal from water**
Materials Today Sustainability
DOI: 10.1016/j.mtsust.2025.101132
- **Self-driven charge transfer mechanism of Bi NPs/PCN-224 for enhanced photodynamic antimicrobial chemotherapy effect**
Journal of Colloid and Interface Science
DOI: 10.1016/j.jcis.2025.02.215
- **Aggregation-Caused quenching or Aggregation-Induced (Enhanced) Emission? The Decisive role of aggregation in solvents and their mixtures**
Journal of Molecular Liquids
DOI: 10.1016/j.molliq.2025.127901
- **Aqueous two-phase emulsion systems in 3D cell culture**
Current Opinion in Colloid and Interface Science
DOI: 10.1016/j.cocis.2025.101933
- **Effect of shot peening on the cavitation erosion of manganese aluminium bronze alloy: Microstructural and**

morphological insights

Materials Letters
DOI: 10.1016/j.matlet.2025.138659

- **Machine Learning Prediction of CO2 Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions**
Applied Sciences (Switzerland)
DOI: 10.3390/app15158536
- **Mechanistic insights into glucose-to-5-HMF conversion in DES media**
Journal of Molecular Liquids
DOI: 10.1016/j.molliq.2025.127774
- **Efficient production of ultrafine poly-p-phenylene benzobisoxazole nanofibres for high-performance polyurea nanocomposites**
Progress in Organic Coatings
DOI: 10.1016/j.porgcoat.2025.109301
- **Retraction: The behavior of Ni nanotubes under the influence of environments with different acidities (CrystEngComm (2018) 20 (3258–3266) DOI: 10.1039/C8CE00362A)**
CrystEngComm
DOI: 10.1039/d5ce90099a
- **THz-fiber waveguide composed of a biocompatible Vase-line core and Teflon holey cladding enabling a centimeter bending radius**
Photonics Research
DOI: 10.1364/PRJ.545598
- **Isolation and alkali treatment of novel natural fiber from Chinese burr stalk for sustainable polymer composites**
Cellulose
DOI: 10.1007/s10570-025-06645-1
- **Precursor concentration-driven structural evolution and phosphate distribution in electrospun zinc phosphate-carbon nanofibers for lithium-ion storage**
Nanoscale
DOI: 10.1039/d5nr00820d
- **Perovskite Solar Cells Modified with Conjugated Self-Assembled Monolayers at Buried Interfaces**
Nanomaterials
DOI: 10.3390/nano15131014
- **Functional Assessment of Microplasma-Sprayed Hydroxyapatite-Zirconium Bilayer Coatings: Mechanical and Biological Perspectives**
Materials
DOI: 10.3390/ma18143405
- **Designing Imidazolium-Mediated Polymer Electrolytes for Lithium-Ion Batteries Using Machine-Learning Approaches: An Insight into Ionene Materials**
Polymers
DOI: 10.3390/polym17152148
- **Process and Composition Parameter Optimization of Friction Stir Process of AA 6101 Aluminum Composites using Response Surface Methodology**
Metals and Materials International
DOI: 10.1007/s12540-025-01901-2

- **Organic Solar Cells for Space Applications: The Crucial Role of Active Layer Thickness**
Advanced Optical Materials
DOI: 10.1002/adom.202501396
- **Boosting the Photoelectrochemical Activity of TiO2-Au Films by Harvesting Infrared Photons with a Li-Codoped NaYF4:Yb,Er Upconversion Layer**
ACS Applied Optical Materials
DOI: 10.1021/acsaom.5c00139
- **Optimizing nitrogen doping strategies in hard carbon for enhanced performance in sodium-ion batteries**
Carbon Trends
DOI: 10.1016/j.cartre.2025.100523

10. Mathematics

Mathematics publications include pure and applied research in modeling, optimization, and data analysis. NU researchers develop mathematical frameworks that support engineering, physics, computer science, and economic applications.

- **Experimental investigation of ANFIS-PSO MPPT control with enriched voltage gain DC–DC converter for grid-tied PV applications**
Electrical Engineering
DOI: 10.1007/s00202-023-02192-9
- **Accurate and Efficient Behavioral Modeling of GaN HEMTs Using An Optimized Light Gradient Boosting Machine**
Advanced Theory and Simulations
DOI: 10.1002/adts.202401565
- **Energy-efficient offloading framework for mobile edge/ cloud computing based on convex optimization and Deep Q-Network**
Journal of Supercomputing
DOI: 10.1007/s11227-025-07647-3
- **Critical Thiele Modulus for Diffusion-Reaction Problems in Catalyst Slabs With Generalized Langmuir-Hinshelwood Kinetics**
Mathematical Methods in the Applied Sciences
DOI: 10.1002/mma.11138
- **Multimodal multimedia information retrieval through the integration of fuzzy clustering, OWA-based fusion, and Siamese neural networks**
Fuzzy Sets and Systems
DOI: 10.1016/j.fss.2025.109419
- **High Fidelity 2-Way Dynamic Fluid-Structure-Interaction (FSI) Simulation of Wind Turbines Based on Arbitrary Hybrid Turbulence Model (AHTM)**
Energies
DOI: 10.3390/en18164401
- **A non-computable c.e. closed subset of [0, 1]**
Journal of Logic and Computation
DOI: 10.1093/logcom/exaf043

11. Multidisciplinary, Decision Sciences & Arts and Humanities

This group reflects NU’s broad intellectual diversity, with publications spanning interdisciplinary problem-solving, decision modeling, and the humanities. Research outputs combine quantitative and qualitative approaches to address global and regional challenges from multiple perspectives.

- **Social Capital and Performance of Public Councils in Kazakhstan**
Journal of Eurasian Studies
DOI: 10.1177/18793665241266260
- **Development, Adoption or Adaption? Researchers’ Attitudes to Forging Social Research Ethics Policy in Kazakhstan, Kyrgyzstan and Uzbekistan**
Journal of Academic Ethics
DOI: 10.1007/s10805-024-09560-5
- **Accurate and Efficient Behavioral Modeling of GaN HEMTs Using An Optimized Light Gradient Boosting Machine**
Advanced Theory and Simulations
DOI: 10.1002/adts.202401565
- **Democratically Digging Together: A Study of Archaeology and Civil Society**
Journal of Eurasian Studies
DOI: 10.1177/18793665241270821
- **Comprehensive tower crane dynamics: An experimental dataset of trajectories and payload oscillations for system identification and machine learning-based control**
Data in Brief
DOI: 10.1016/j.dib.2025.111822
- **Research Ethics Education for the Social Sciences in Central Asian Contexts**
Journal of Eurasian Studies
DOI: 10.1177/18793665251357324
- **Displacement and quantification without representation**
Mind and Language
DOI: 10.1111/mila.12540
- **REBCO superconductors by pulsed laser deposition: Key innovations and large-scale applications**
iScience
DOI: 10.1016/j.isci.2025.113260
- **Ancient DNA reveals the prehistory of the Uralic and Yeniseian peoples**
Nature
DOI: 10.1038/s41586-025-09189-3
- **Materials on Deedmongol**
Acta Orientalia
DOI: 10.1556/062.2025.00370
- **Post-Soviet Protests: The Causes and Consequences of Public Uprisings in Central Asia**
Journal of Eurasian Studies
DOI: 10.1177/18793665251357326
- **Carving out a niche for Chinese fungi: Specimens and war**

in Sino-US scientific interaction, 1920s-1940s
Journal of the History of Collections
DOI: 10.1093/jhc/fhaf010

- **Epidemiology of liver cancer in Kazakhstan: data from the Unified National Electronic Health System, 2014–2023**
PLOS ONE
DOI: 10.1371/journal.pone.0330423

- **A non-computable c.e. closed subset of [0, 1]**
Journal of Logic and Computation
DOI: 10.1093/logcom/exaf043

12. Multidisciplinary, Decision Sciences, Psychology & Arts and Humanities

Adding psychology to the multidisciplinary mix highlights NU’s human-centered research dimension. Publications focus on cognition, social behavior, and decision-making processes, enriching interdisciplinary studies and connecting STEM with the humanities and social sciences.

- **Social Capital and Performance of Public Councils in Kazakhstan**
Journal of Eurasian Studies
DOI: 10.1177/18793665241266260
- **Development, Adoption or Adaption? Researchers’ Attitudes to Forging Social Research Ethics Policy in Kazakhstan, Kyrgyzstan and Uzbekistan**
Journal of Academic Ethics
DOI: 10.1007/s10805-024-09560-5
- **Accurate and Efficient Behavioral Modeling of GaN HEMTs Using An Optimized Light Gradient Boosting Machine**
Advanced Theory and Simulations
DOI: 10.1002/adts.202401565
- **Democratically Digging Together: A Study of Archaeology and Civil Society**
Journal of Eurasian Studies
DOI: 10.1177/18793665241270821
- **Comprehensive tower crane dynamics: An experimental dataset of trajectories and payload oscillations for system identification and machine learning-based control**
Data in Brief
DOI: 10.1016/j.dib.2025.111822
- **Research Ethics Education for the Social Sciences in Central Asian Contexts**
Journal of Eurasian Studies
DOI: 10.1177/18793665251357324
- **Displacement and quantification without representation**
Mind and Language
DOI: 10.1111/mila.12540
- **REBCO superconductors by pulsed laser deposition: Key innovations and large-scale applications**
iScience
DOI: 10.1016/j.isci.2025.113260

- **Ancient DNA reveals the prehistory of the Uralic and Yeniseian peoples**
Nature
DOI: 10.1038/s41586-025-09189-3
- **Materials on Deedmongol**
Acta Orientalia
DOI: 10.1556/062.2025.00370
- **Post-Soviet Protests: The Causes and Consequences of Public Uprisings in Central Asia**
Journal of Eurasian Studies
DOI: 10.1177/18793665251357326
- **Carving out a niche for Chinese fungi: Specimens and war in Sino-US scientific interaction, 1920s-1940s**
Journal of the History of Collections
DOI: 10.1093/jhc/fhaf010
- **Epidemiology of liver cancer in Kazakhstan: data from the Unified National Electronic Health System, 2014–2023**
PLOS ONE
DOI: 10.1371/journal.pone.0330423
- **A non-computable c.e. closed subset of [0, 1]**
Journal of Logic and Computation
DOI: 10.1093/logcom/exaf043

13. Physics & Astronomy

Research in physics and astronomy covers fundamental and applied studies, from theoretical physics to astrophysical modeling. NU publications contribute to understanding matter, energy, and the universe, with implications for technology and space science.

- **Design of an event-triggered extended dissipative state estimator for neural networks with multiple time-varying delays**
European Physical Journal: Special Topics
DOI: 10.1140/epjs/s11734-024-01240-0
- **Aggregation-Caused quenching or Aggregation-Induced (Enhanced) Emission? The Decisive role of aggregation in solvents and their mixtures**
Journal of Molecular Liquids
DOI: 10.1016/j.molliq.2025.127901
- **Aqueous two-phase emulsion systems in 3D cell culture**
Current Opinion in Colloid and Interface Science
DOI: 10.1016/j.cocis.2025.101933
- **Effect of shot peening on the cavitation erosion of manganese aluminium bronze alloy: Microstructural and morphological insights**
Materials Letters
DOI: 10.1016/j.matlet.2025.138659
- **Machine Learning Prediction of CO2 Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions**
Applied Sciences (Switzerland)
DOI: 10.3390/app15158536
- **Composite Metal Oxide Nanopowder-Based Fiber-Optic Fabry–Perot Interferometer for Protein Biomarker**

Detection
Biosensors
DOI: 10.3390/bios15070449

- **Through the looking-glass, and what AdS found there: quantum particle production with a Whittaker spectrum**
Journal of High Energy Physics
DOI: 10.1007/JHEP08(2025)101
- **Mechanistic insights into glucose-to-5-HMF conversion in DES media**
Journal of Molecular Liquids
DOI: 10.1016/j.molliq.2025.127774
- **Retraction: The behavior of Ni nanotubes under the influence of environments with different acidities (CrystEngComm (2018) 20 (3258–3266) DOI: 10.1039/C8CE00362A)**
CrystEngComm
DOI: 10.1039/d5ce90099a
- **THz-fiber waveguide composed of a biocompatible Vase-line core and Teflon holey cladding enabling a centimeter bending radius**
Photonics Research
DOI: 10.1364/PRJ.545598
- **Explaining JWST Counts with Galaxy Formation Models**
Astrophysical Journal
DOI: 10.3847/1538-4357/ade700
- **Functional Assessment of Microplasma-Sprayed Hydroxyapatite-Zirconium Bilayer Coatings: Mechanical and Biological Perspectives**
Materials
DOI: 10.3390/ma18143405
- **R-matrix analysis of 22Ne structure in the energy range 11.7-13.38 MeV**
EPJ Web of Conferences
DOI: 10.1051/epjconf/202533102002
- **Cloud-cloud collision and star formation in G013.313+0.193**
Astronomy and Astrophysics
DOI: 10.1051/0004-6361/202453285
- **Process and Composition Parameter Optimization of Friction Stir Process of AA 6101 Aluminum Composites using Response Surface Methodology**
Metals and Materials International
DOI: 10.1007/s12540-025-01901-2
- **Organic Solar Cells for Space Applications: The Crucial Role of Active Layer Thickness**
Advanced Optical Materials
DOI: 10.1002/adom.202501396
- **Galaxy formation with wave/fuzzy dark matter: The core-halo structure and the solitonic imprint**
Astronomy and Astrophysics
DOI: 10.1051/0004-6361/202450443
- **Magnetic Field of a Ring-like Molecular Cloud**
Astronomical Journal
DOI: 10.3847/1538-3881/ade9f

- **Quadrupole–hexadecapole coupling in the rare earth region with beyond mean field correlations**
European Physical Journal A
DOI: 10.1140/epja/s10050-025-01638-x
- **Boosting the Photoelectrochemical Activity of TiO2-Au Films by Harvesting Infrared Photons with a Li-Codoped NaYF4:Yb,Er Upconversion Layer**
ACS Applied Optical Materials
DOI: 10.1021/acsaom.5c00139
- **Formaldehyde in the Cygnus-X region**
Monthly Notices of the Royal Astronomical Society
DOI: 10.1093/mnras/staf1346
- **Evolution of star clusters with initial bulk rotation via N-body simulations**
Astronomy and Astrophysics
DOI: 10.1051/0004-6361/202554093
- **OTDR signature of polymer optical fiber for deformation monitoring**
Measurement: Journal of the International Measurement Confederation
DOI: 10.1016/j.measurement.2025.117757

14. Social Sciences

- Social sciences remain one of the strongest areas at NU, encompassing education, sociology, political science, and development studies. Publications offer critical perspectives on societal change, governance, and human development, strengthening NU's role in knowledge-based policymaking.
 - **Higher Education Leadership Agency in Mainstreaming Gender Equality: Insights From Universities in Kazakhstan**
Gender, Work and Organization
DOI: 10.1111/gwao.13239
 - **Social Capital and Performance of Public Councils in Kazakhstan**
Journal of Eurasian Studies
DOI: 10.1177/18793665241266260
 - **Development, Adoption or Adaption? Researchers' Attitudes to Forging Social Research Ethics Policy in Kazakhstan, Kyrgyzstan and Uzbekistan**
Journal of Academic Ethics
DOI: 10.1007/s10805-024-09560-5
 - **Democratically Digging Together: A Study of Archaeology and Civil Society**
Journal of Eurasian Studies
- DOI: 10.1177/18793665241270821
 - **Research Ethics Education for the Social Sciences in Central Asian Contexts**
Journal of Eurasian Studies
DOI: 10.1177/18793665251357324
 - **Displacement and quantification without representation**
Mind and Language
DOI: 10.1111/mila.12540
 - **Measuring energy poverty by estimating the income elasticity of energy demand: An application to Kazakhstan**
Utilities Policy
DOI: 10.1016/j.jup.2025.101901
 - **The role of student–teacher college practicum experience on teaching self-efficacy, belief in the profession, and intention to teach in Kazakhstan**
Asia Pacific Education Review
DOI: 10.1007/s12564-025-10059-w
 - **Who recounts the Stalinist past? Mnemonic roles, acts of remembering and life-scripts in Russian families**
Current Sociology
DOI: 10.1177/00113921241238431
 - **Advancements of carbon nanomaterials-modified asphalt: Processes, properties, economic feasibility and future perspectives**
Journal of Traffic and Transportation Engineering (English Edition)
DOI: 10.1016/j.jtte.2024.10.002
 - **Materials on Deedmongol**
Acta Orientalia
DOI: 10.1556/062.2025.00370
 - **PIAAC Survey of Adult Skills: A review of the research landscape**
International Review of Education
DOI: 10.1007/s11159-024-10123-4
 - **Post-Soviet Protests: The Causes and Consequences of Public Uprisings in Central Asia**
Journal of Eurasian Studies
DOI: 10.1177/18793665251357326
 - **Carving out a niche for Chinese fungi: Specimens and war in Sino-US scientific interaction, 1920s-1940s**
Journal of the History of Collections
DOI: 10.1093/jhc/fhaf010



Dear NU Researchers,
We are always proud to share your achievements and news. If you have a story to tell, we warmly invite you to submit it for publication in a future issue of the newsletter.

Editorial Team
Ainur Zhumasheva – Senior Coordinator for Research Promotion
Bibigul Makazhanova – Senior Coordinator for Communications