

RESEARCH NEWSLETTER



NAZARBAYEV
UNIVERSITY

Research
Features

University
Research Life

Opportunities
& Publications

Cover Image: Sense of Light

A robotic arm holds a transparent sphere that diffracts light and allows polarized light to pass through. The photograph won the General Category at the Kazakhstan national stage of the 2025 Wiki Science Photo Competition.

Photo by Dimash Mukashev

IN THIS ISSUE

Nazarbayev University Research Newsletter

50 | 2026
JUBILEE EDITION

НАЗАРБАЕВ УНИВЕРСИТЕТІ

WELCOME MESSAGE4

A DECADE OF GROWTH, RESEARCH AND GLOBAL IMPACT6

NURA IMPACT REPORT SUPPORTING RESEARCH EXCELLENCE.....8

SPOTLIGHT ON SUCCESS

How Narratives Shape Public Support for Chinese Investment in Central Asia 11

Historic Recognition: NU Scholar Receives Prestigious Michael Fullan Award14

When Research Reaches Policy: Expert Advice That Helped Shape Kazakhstan's Monetary Policy Strategy 203015

From Solar Energy to Stored Hydrogen: How NU Researchers Built a Homegrown Green Hydrogen System16

Partial Reprogramming: From Drawing Board to Clinical Trials18

NU Researchers Honored with National Science Awards21

BEHIND THE RESEARCH

Rethinking Nutrition Science for Central Asia's Population Health 23

Rendering the Invisible Visible: How NU Researchers Decode Astana's PM_{2.5} Pollution 26

Central Asia's Gulag: Fieldwork in Volkovskoe, Karazhar, and Manzhi 29

Behind the Research: Interview with Milovan Fustic31

From Biomass to Pharma: NU Researchers Develop Novel Continuous Flow Technology for Sustainable API Production 34

Building Roads That Last: Research for a More Sustainable Kazakhstan 35

RESEARCH SNAPSHOT

From Soil-Water Interaction to Smart Slope Stability 39

Radiation-Tolerant Bifacial Perovskite Photodetectors for Harsh Environments 43

From Chaos to Order: A Top 2% Journal Study on Satellite Orientation Stability..... 45

Toward More Sustainable Plagiarism Policies in an AI Higher Education Environment 47

Lattice Structures: The Future of Lighter, Stronger, Smarter Aerospace and Biomedical Designs 49

Advancing Carbon Storage: From Subsurface Physics to Predictive Modeling of CO₂ Behavior51

Top 1% NU Master's Student Publishes Five Research Papers in One Year 53

NU Bachelor Students Co-Author a Research Paper Showing How Applied Mathematics Can Advance MEMS Design 55

UNIVERSITY RESEARCH LIFE

NUGSE News: From AI-Driven Sustainability to Global Editorial Leadership 59

NU SDSN News: Shaping Sustainable Futures Beyond 2030 63

Gender and Higher Education: A Bibliometric Analysis of Global Research Trends 64

2nd NU SEDS Annual Research Conference 68

NU Annual Research Conference 202671

DeepTech Bäge Finals at NU 73

From the Microcosm to the Cosmos: Inside Kazakhstan's 2025 Wiki Science Competition 75

DeepTech Bäge Finals at NU 73

From the Microcosm to the Cosmos: Inside Kazakhstan's 2025 Wiki Science Competition 75

OPPORTUNITIES & PUBLICATIONS

New Research Publications Indexed in Scopus 93

List of External Research Funding Opportunities ...94

Publish Your Research Open Access 96

Behind This Issue 98

Welcome Message from the Vice Provost for Research and Innovation



ID Professor Bjorn Birgisson
Vice Provost for Research
and Innovation Nazarbayev University

**Dear colleagues,
students, partners,
and friends,**

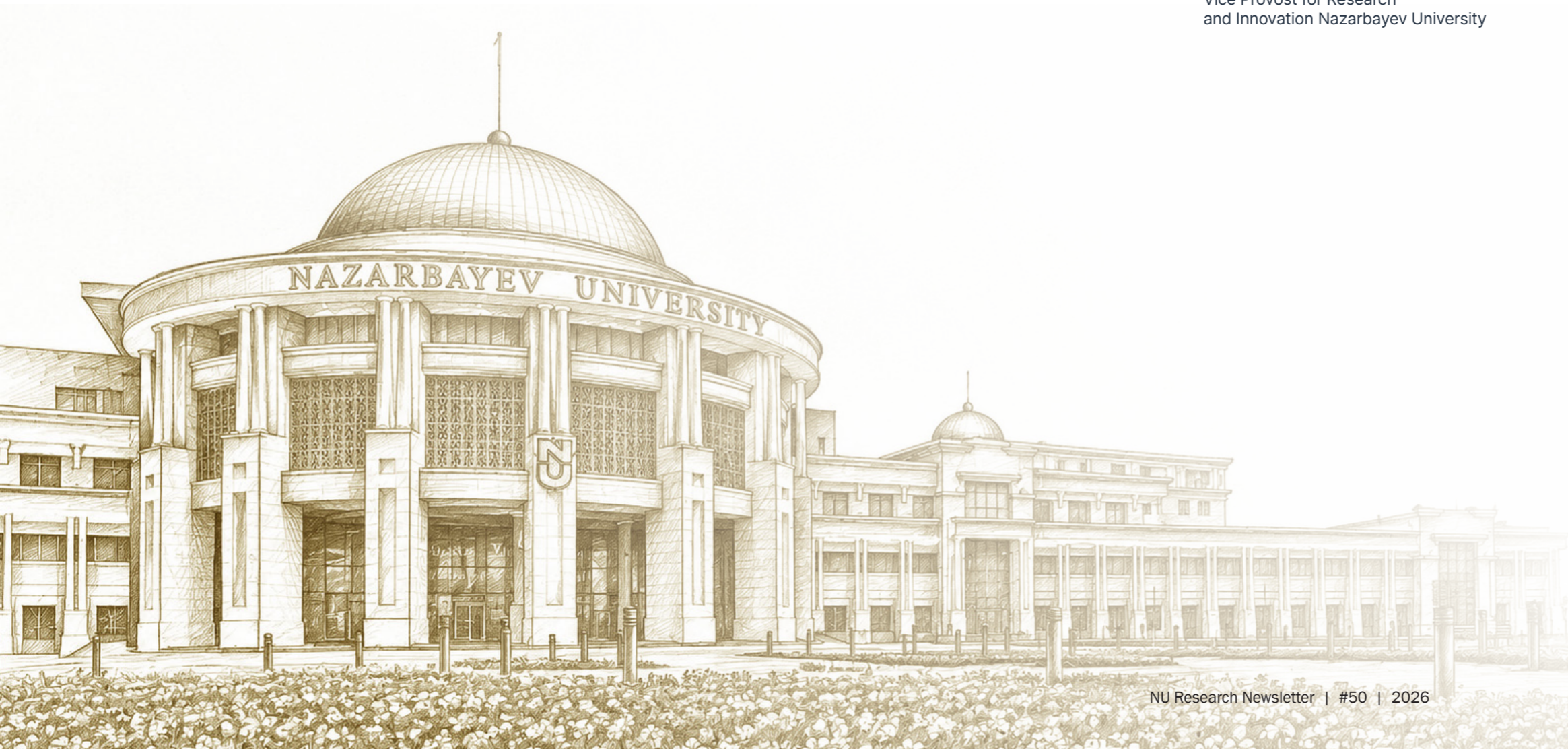
It is my great pleasure to welcome you to Nazarbayev University's research community. At NU, research is a commitment to advancing knowledge, shaping the future of Kazakhstan and contributing to the global community. As a young research-intensive university, we foster an environment where curiosity, creativity, collaboration, and excellence thrive.

Our faculty, researchers, students, and staff work across disciplines to spark new ideas, develop innovative solutions, and translate discoveries into meaningful impact. Spanning engineering, medicine, social sciences, education, energy, sustainability, and digital technologies, NU's research addresses both global scientific frontiers and the specific needs of our region.

As Vice Provost for Research and Innovation, I am proud to champion a research ecosystem rooted in bold thinking, responsible innovation, international collaboration, and the highest standards of academic integrity. By strengthening our partnerships with government, industry, international institutions, and society, we ensure that NU's research advances scholarly knowledge and drives real-world progress.

I invite you to explore the opportunities within our vibrant research community. Together, we will continue to elevate Nazarbayev University as a leading hub of research and innovation.

Sincerely,
Professor Bjorn Birgisson
Vice Provost for Research and Innovation
Nazarbayev University



A DECADE OF GROWTH. RESEARCH. GLOBAL IMPACT.

Celebrating the 50th Issue of the Research Newsletter

GROWING TOGETHER

STUDENTS ENROLLED

2015	2025
3,386	7,931

↑ 134%
INCREASE

FACULTY & TEACHING ACADEMIC STAFF

2015	2025
356	518

↑ 46%
INCREASE

RESEARCH EXCELLENCE

SCOPUS-INDEXED PUBLICATIONS

2015	2025
270	1615

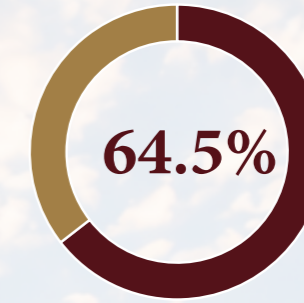
↑ 498%
INCREASE IN RESEARCH OUTPUT

CITATIONS RECEIVED

207,537
TOTAL CITATIONS (2015-2025)

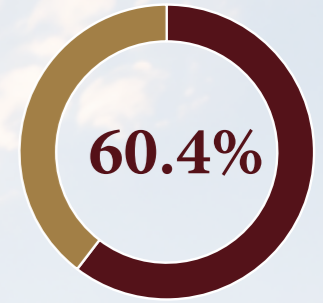
18.9
AVERAGE CITATIONS PER PUBLICATION

INTERNATIONAL COLLABORATION



OF PUBLICATIONS WITH INTERNATIONAL COLLABORATION

PUBLICATIONS IN TOP JOURNALS (Q1)



OF TOTAL PUBLICATIONS

A GLOBAL COMMUNITY

INTERNATIONAL STUDENTS

2015	2025
12	326

0.4% → 4.1%
INTERNATIONAL STUDENT SHARE

STUDENTS FROM

36

COUNTRIES IN 2025

FACULTY REPRESENTING

54

COUNTRIES IN 2025

INTERNATIONAL FACULTY (2025)

65.4%

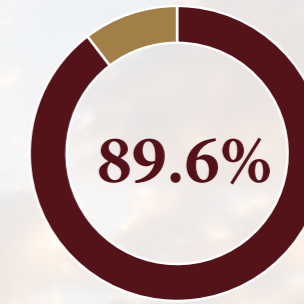
INTERNATIONAL

EDUCATING FUTURE LEADERS



12,039

STUDENTS GRADUATED SINCE 2015



UNDERGRADUATE GRADUATION RATE WITHIN 6+ YEARS

GLOBAL RECOGNITION



TOP 106
WORLD YOUNG UNIVERSITIES



TOP 23%
INTERNATIONAL RESEARCH UNIVERSITIES WORLDWIDE



22 COUNTRIES
GLOBAL RESEARCH PARTNERSHIPS

NAZARBAYEV UNIVERSITY

2015-2025

A DECADE OF PROGRESS. A FUTURE OF POSSIBILITIES. TOGETHER, WE MAKE AN IMPACT THAT MATTERS.

Note: Data presented are based on Scopus records as of 27 May 2026 and the Nazarbayev University Data Digest 2025-2026.

Nazarbayev University Research Administration

SUPPORTING RESEARCH EXCELLENCE

YEAR ONE IMPACT REPORT

LOOKING BACK, MOVING FORWARD



“Our first year focused on building systems, trust, and operational excellence to support a growing research ecosystem.”

Since its establishment in 2025, the Private Institution “Nazarbayev University Research Administration” (NURA) has been dedicated to strengthening the support ecosystem that enables research excellence at Nazarbayev University.

Over the past year, NURA has built a more integrated and researcher-focused support system by bringing together key services such as Pre-Award, Post-Award, Procurement, Human Resources, Legal and Visa Support, and Research Promotion. This integration has streamlined previously fragmented processes and created a coordinated framework that supports researchers throughout the entire research lifecycle.

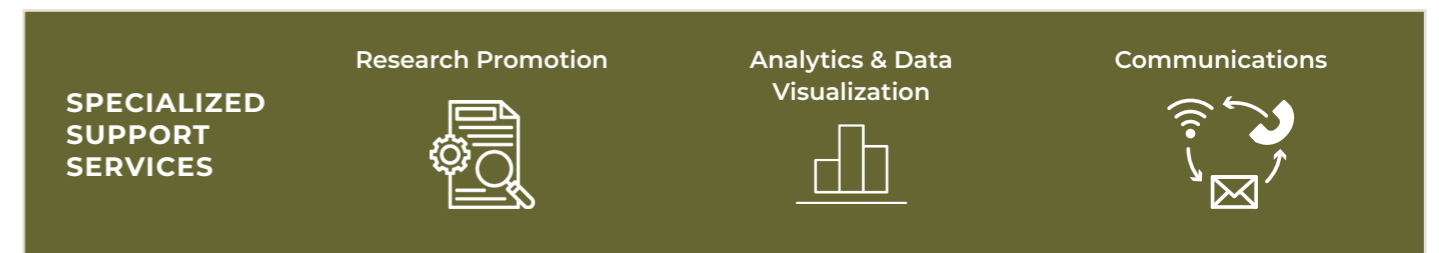
Today, NURA serves as a trusted support hub at every stage of research - from identifying funding opportunities and developing grant proposals to project implementation, procurement, international researcher onboarding, publication support, intellectual property protection, and the promotion of research impact.

As NURA enters its second year, it remains focused on optimizing and digitalizing processes, enhancing service quality, expanding research promotion activities, and strengthening innovation and prototyping support. Building on a strong foundation, NURA will continue to foster an efficient, transparent, and researcher-centered environment that empowers the NU research community to achieve greater success and impact.

HOW WE SUPPORT RESEARCH

Our Integrated Research Support Model

A collaborative structure that supports researchers at every step of their journey.



A YEAR OF SERVICE TO FACULTY & RESEARCHERS

500+ Individual Consultations	225 External Funding Opportunities Shared	101 Technical Assignments & Industry Proposals Submitted	201 Projects Managed by NURA in 2025
46 Information Sessions/Workshops	91 External Applications Submitted	300 Internal & MSHE Proposals Processed	267 Active Projects Since 2026

₸6.4B Total Research Budget Managed	818 Purchase Requests Processed	121 International Researchers Supported	350+ Research Personnel Onboarded
57 Projects Successfully Closed by the end of 2025	248 Vendors Onboarded	120 Visa & Immigration Cases Managed	2 Journal Editions Released

OUR MISSION

To enhance the quality of research administration and provide comprehensive support that enables world-class research and innovation

CONTACT US

Astana, Kabanbay Batyr Ave, 53, Block C4
nura@nu.edu.kz | +7 (7172) 70-58-23



SPOTLIGHT ON SUCCESS

Achievements, recognitions and research milestones from across the NU research community.

HOW NARRATIVES SHAPE PUBLIC SUPPORT FOR CHINESE INVESTMENT IN CENTRAL ASIA



ID Jessica Neafie
Assistant Professor
School of Sciences and Humanities,
Department of Political Science and
International Relations

Dr Jessica Neafie has been awarded a UKRI Network Plus grant (£14,000) to support a 12-month research project on Kazakhstan's evolving role in the global green energy transition.



The project, "**Bridging Green Orders: Kazakhstan's Dual Engagement with EU and China's Energy Frameworks**," examines how Kazakhstan sustains parallel partnerships with the European Union and China while navigating an increasingly multipolar energy order. Drawing on elite interviews and policy analysis, the research explores how global governance frameworks are adapted domestically, shaping infrastructure development, regulatory approaches, and strategic autonomy.

As part of the award, Dr Neafie will be mentored by Professor Luca Anceschi (University of Glasgow, School of Social and Political Sciences). The project will generate both academic and policy-facing outputs, contributing to debates on multivector foreign policy, energy transition governance, and emerging global energy systems.

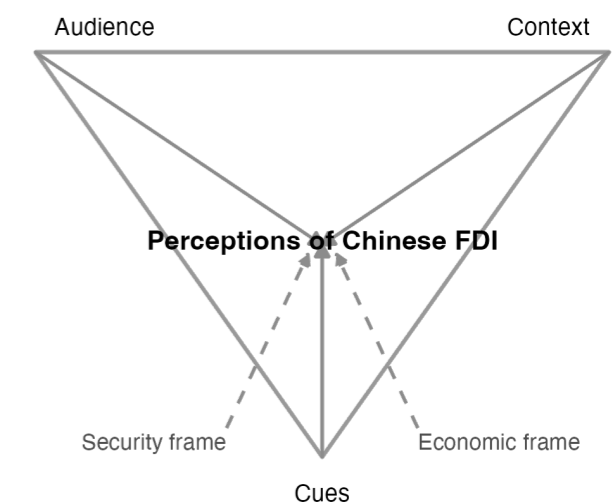
WHY DOES THIS RESEARCH MATTER?

How Chinese investment is described to local communities can shape whether people support it or reject it.

The article, "**Strategic Narratives and Public Support for Chinese Investment: Evidence from a Survey Experiment in Kyrgyzstan**," published in the Journal

of Chinese Political Science (a top 10-ranked journal in Political Science and International Relations), and examines how competing economic and security narratives influence public attitudes toward Chinese foreign direct investment (FDI) in Kyrgyzstan.

A NEW STUDY BY NU RESEARCHERS ANSWERS YES, AND SHOWS EXACTLY HOW





The study, authored by Dr Jessica Neafie alongside Aigerim Aibassova, a PhD Candidate in Eurasian Studies, and Dr Chris Primiano, a US researcher from Huntingdon College, reflects ongoing scholarly collaboration within Nazarbayev University's research environment. Using a nationally administered survey experiment (n = 1,548), the researchers demonstrate that the Kyrgyz public responds to Chinese foreign direct investment (FDI) in ways that are structured, differentiated, and sensitive to narrative framing.

The findings demonstrate that public responses to Chinese investment are structured rather than uniform, with respondents differentiating across investor types and investment modalities. The results show that exposure to security-focused narratives significantly reduces support for Chinese FDI, particularly for state-owned and greenfield investments. By contrast, economic narratives produce more heterogeneous effects, interacting with audience characteristics such as age, urbanicity, and economic outlook. These findings underscore that public opinion reflects a balance between perceived economic opportunity and geopolitical risk. Economic engagement is more likely to be supported when framed as mutually beneficial and transparently governed. As the study finds, "security narratives significantly reduce support for Chinese FDI, whereas economic threat narratives have weaker, more heterogeneous effects."

The research finds that the public is discerning rather than passive. Respondents distinguish clearly between investor types (SOE vs private) and investment modes (greenfield vs acquisition), rejecting the assumption that attitudes toward Chinese investment are uniform or purely instinctive.



Overall, the study contributes to research on political communication, foreign investment, and China's global engagement by demonstrating that public attitudes toward FDI are shaped not only by material considerations, but also by how investment is framed and interpreted within specific social and political contexts. The ACC framework offers a new analytical lens with relevance beyond Kyrgyzstan and can be applied more broadly to the study of public opinion toward Chinese overseas investment across the Global South.

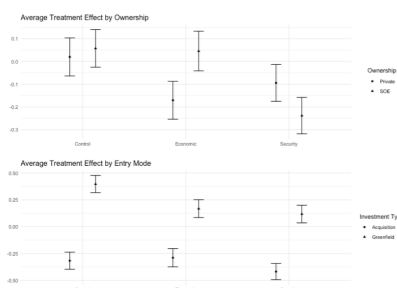
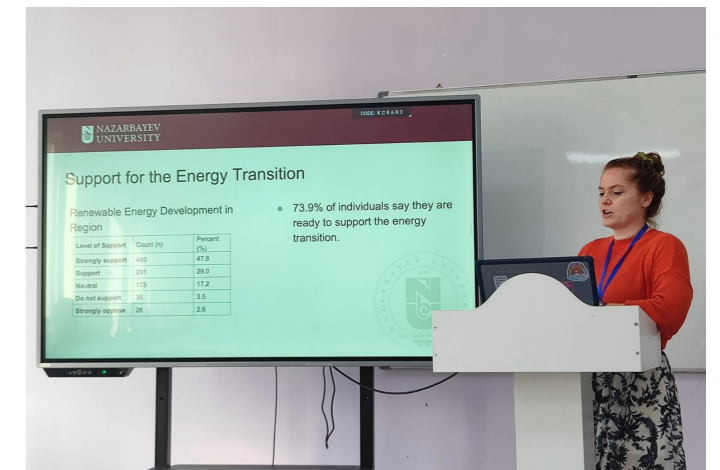


Figure 2: ATE of contextual variables by ownership and entry mode, with 95% confidence intervals

TONE	THEME	INTERPRETATION	ILLUSTRATIVE QUOTE
Supportive	Economics	Views China as a reliable and helpful economic partner.	"We need investment, and China is helping."
Positive	Economics	China seen as driving growth, jobs, and infrastructure.	"China is giving us money and building roads."
Neutral	Security	Acknowledges the relationship as stable or unproblematic.	"Stable and good relations."
Cautious	Security	Wary of growing dependency or erosion of sovereignty.	"If China wants, it can take over us—they have all the money."
Sceptical	Economics	Economic links viewed as lopsided or exploitative.	"Chinese goods are low quality, but cheap."
Alarmed	Security	Sees China as a threatening or imperial actor.	"China wants to dominate the whole world."

Tonal Mapping of Public Sentiment on China in Kyrgyzstan (Security & Economic Themes)



BEHIND THE RESEARCH

This project was shaped through field-based research in Kyrgyzstan, combining survey experimentation with in-country data collection across 45 sampling stations located in urban, suburban, and rural areas.

The work required the team to navigate significant linguistic, logistical, and methodological challenges, including the delivery of a trilingual survey in Kyrgyz, Russian, and English, while ensuring consistency and rigour across all treatment conditions.

Researchers interested in the story behind the study. From fieldwork and experimental design to collaboration across contexts, are invited to connect with the authors, who are available for interviews on the development of the project and the empirical research conducted in Kyrgyzstan.

PUBLICATION DETAILS

Article: *Strategic Narratives and Public Support for Chinese Investment: Evidence from a Survey Experiment in Kyrgyzstan*

Journal: *Journal of Chinese Political Science*

Published online: 23 March 2026

Accepted: 28 January 2026

DOI: [10.1007/s11366-026-09933-0](https://doi.org/10.1007/s11366-026-09933-0)

Funding note

The published research was supported by **FDCRGP from Nazarbayev University**. The new international project is supported by a **UKRI Network Plus grant**.

HISTORIC RECOGNITION NU: SCHOLAR RECEIVES PRESTIGIOUS MICHAEL FULLAN AWARD



Dr. Assel Sharimova, a postdoctoral researcher at the Graduate School of Education of Nazarbayev University, has been named a 2026 recipient of the Michael Fullan Emerging Scholar in Professional Capital and Community Award. In 2026, only two researchers worldwide received this honor, making her recognition both highly competitive and historically significant.

ID Dr. Assel Sharimova becomes the first scholar from Kazakhstan and the post Soviet region to earn one of the respected international awards in education research



This achievement marks the first time a scholar from Kazakhstan and from the entire post-Soviet region has received this prestigious award. It highlights not only Dr. Sharimova's academic excellence, but also the growing international visibility of research emerging from Nazarbayev University.

Dr. Sharimova holds a PhD in Education from the University of Cambridge and has spent the past five years at NU advancing research in teacher professional learning. Prior to joining academia, she worked at the Center of Excellence within the Nazarbayev Intellectual Schools system, contributing to program development and international collaboration.

Her research focuses on how teachers develop and mobilize professional capital through virtual professional communities. In particular, she examines how social media and online networks support informal learning, especially in education systems undergoing reform where access to structured professional development may be uneven.

“I became interested in how collaborative learning can extend beyond formal training. My research explores how virtual communities enable teachers to learn from each other and build professional support networks,” she explains.

The award is presented by the Journal of Professional Capital and Community to early career scholars whose work demonstrates originality, practical relevance, and strong potential to influence education systems. Along with international recognition, recipients receive a monetary prize and increased visibility within the global academic community.

Dr. Sharimova's achievement reflects a broader shift in global education research, where

innovative ideas are increasingly emerging from diverse and previously underrepresented regions. Her work contributes not only to academic knowledge but also offers practical insights into how teacher collaboration can strengthen education systems.

This milestone underscores Nazarbayev University's growing role in shaping global conversations on education and highlights the impact of research that connects local challenges with global solutions.

WHEN RESEARCH REACHES POLICY: EXPERT ADVICE THAT HELPED SHAPE KAZAKHSTAN'S MONETARY POLICY STRATEGY 2030



ID Joep Konings, Professor and Dean of the Graduate School of Business at Nazarbayev University



ID Prof. Oliver de Groot, Professor at the University of Liverpool and Head of the Economics Subject Group



BACKGROUND

The objective of the National Bank of the Republic of Kazakhstan (NBRK) is to ensure price stability in Kazakhstan. Like many central banks around the world, the Kazakhstan economy has recently been experiencing high (and above-target) inflation.

In 2022, the NBRK began to review its Monetary Policy Strategy and was seeking external international experts in the field of monetary economics to provide input to the strategy review. As such, in November 2022, the NBRK commissioned Prof. Joep Konings (NUGSB) and Prof. Oliver de Groot (Liverpool) to write a report on the optimal inflation target for Kazakhstan. Prof. Joep Konings and Prof. Oliver de Groot were selected because of their past experience working as economists at several central banks, including the US Federal Reserve and the European Central Bank, as well as their academic reputation in the field, including publications in world-leading academic journals such as *American Economic Review*, *Econometrica*, and *the Journal of Monetary Economics*.

PROCESS

Prof. de Groot and Prof. Konings worked on preparing their report during the period from December 2022 to February 2023. During this period, they presented and discussed preliminary results on three occasions with staff at the NBRK. Stakeholders present at these presentations included staff of the monetary strategy and research divisions, several Deputy Governors, and, on one occasion, the Governor. In March 2023, Prof. de Groot and Prof. Konings delivered the final version of their report (both in English and Russian), de

Nazarbayev University is proud to provide this letter in support of Prof. Joep Konings and Prof. Oliver de Groot's REF Impact Case Study.

KEY HIGHLIGHTS:

- Commissioned by NBRK: November 2022
- Research period: December 2022 – February 2023
- Final report delivered: March 2023
- Published in: Special Issue of the *Economic Review of the NBRK*
- Policy relevance: Findings contributed to inflation target refinement announced on July 7, 2023
- Strategic impact: Research reflected in the **Monetary Policy Strategy**

Groot and Konings (2023). This was published in a Special Issue of the *Economic Review of the NBRK* (Chapter 2, pp. 27–50). It was also presented at the Third International Scientific and Practical Conference, “Strategic Issues of the Monetary Policy: Challenges of the New Economic Reality”, held on April 25, 2023, in Almaty, Kazakhstan. The final report and the frequent interactions with Prof. de Groot and Prof. Konings formed a valuable part of the NBRK's internal policy deliberations in the weeks thereafter.

This reference to external and international experts reflects the valuable research work of Prof. de Groot and Prof. Konings, which informed the NBRK's thinking and policy decisions.

More broadly, on July 7, 2023, the NBRK also published its Monetary Policy Strategy 2030. This is a long-term document that determines the direction of development of monetary policy until 2030, including the decision to refine the inflation target. The section of the strategy document on “Inflation Targets” (p. 4) and the accompanying Appendix 2-1 (Part 2, “Results of studies on the assessment of possible inflation targets”, pp. 31–33) is directly drawn from the de Groot and Konings (2023) report.

While it is still too early to ascertain the full economic benefits of these policy changes, the NBRK regularly reviews its policy decisions and will no doubt publish assessments of these decisions in the years ahead.

POLICY IMPACT

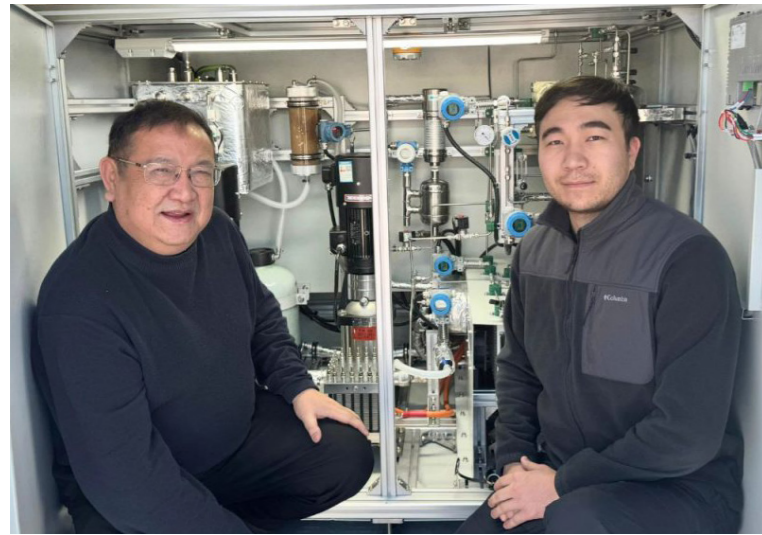
On July 7, 2023, the NBRK announced that it was refining its inflation target. The accompanying press release states:

“Appropriateness of refining the inflation target is confirmed by international experience and studies conducted by the National Bank with the participation of both internal and external experts, including international ones. The updated inflation target is in line with the range that was obtained from the results of studies on the feasibility of the target in Kazakhstan, published in a Special Issue of the Economic Review.”

SUMMARY

Nazarbayev University is proud of the contribution made by Prof. Joep Konings, along with his co-author Prof. Olivier de Groot, and grateful for the time, expertise, and advice they provided. Further, NBRK has a long-term partnership with the NUGSB in terms of the Master of Science in Finance program. Many of these students on this program are on NBRK-funded scholarships and will join the NBRK afterwards, this will represent another indirect benefit to the NBRK and its objective of ensuring price stability in Kazakhstan.

FROM SOLAR ENERGY TO STORED HYDROGEN: HOW NU RESEARCHERS BUILT A HOMEGROWN GREEN HYDROGEN SYSTEM



ID Prof. Nurxat Nuraje, Head of the Renewable Energy Laboratory: “What began as fundamental research on photocatalysts and photoactive materials has now evolved into an integrated hydrogen platform operating under real conditions. This is an important step toward practical green hydrogen technologies in Kazakhstan.”

ID Dr. Yerbolat Magazov, Hydrogen Production Team Leader: “Our goal is not only to produce hydrogen, but to develop a complete research and engineering platform that includes generation, storage, safety, and future scale-up. The system on the NU campus demonstrates that locally developed solutions can move from laboratory science to real infrastructure.”

A NATIONAL MILESTONE IN GREEN HYDROGEN

The launch of Nazarbayev University's first home-grown green hydrogen production system marks a major milestone for the Hydrogen Production and Storage Team at the Renewable Energy Laboratory, National Laboratory Astana. Announced by NU in December 2025, the pilot full-cycle facility operates on electricity generated by solar panels and wind turbines and demonstrates the complete green hydrogen pathway: renewable power, water electrolysis, hydrogen production, and storage in a single integrated platform. The system was developed using domestic patents and engineering solutions created by the laboratory, in collaboration with industrial partners.

BUILDING THE SCIENTIFIC FOUNDATION

This achievement builds on a much longer research trajectory. Since 2020, the Renewable Energy Lab has been developing the scientific foundations for hydrogen production from solar energy, beginning with work

The Renewable Energy Laboratory led by Prof. Nurxat Nuraje at the National Laboratory Astana, Nazarbayev University, has launched the country's first integrated homegrown green hydrogen production system. The pilot platform converts electricity from solar panels and wind turbines into hydrogen, which is then stored for further use, marking an important step from laboratory research toward practical hydrogen-energy deployment in Kazakhstan.

on nanointerface-engineered heterostructured photocatalysts led by Prof. Nurxat Nuraje. In its early phase, the team focused on the mechanisms of photocatalytic water splitting and on designing nanostructured photoactive materials capable of more efficient light harvesting and charge separation as a basis for future hydrogen technologies.

RESEARCH PROGRAM THAT ACCELERATED PROGRESS

A major acceleration came through the targeted funding program led by Prof. Nuraje (PI) “Development of Green Energy: Fundamental Research of Solar Fuel Technologies for Sustainable Production and Advanced Storage” (2023–2025). This program helped the laboratory strengthen both its scientific and applied capacity, expand cooperation with partners in Kazakhstan and abroad, and build expertise across the green hydrogen value chain. The work involved collaborations with Atyrau University, Karaganda Buketov University, KMG Engineering, Tokai University, Wichita



State University, and the University of Massachusetts Amherst. Over this period, the team produced more than 40 papers, secured 7 domestic patents, and prepared 4 book chapters and 5 monographs related to hydrogen production and storage.

EXPANDING THROUGH INTERNATIONAL COLLABORATION

More recently, the team's momentum has continued through a new Matching Research Program project, “Dual-Photoelectrode Tandem Architectures for Efficient Unbiased Solar-Driven Water Splitting,” led by Prof. Nurxat Nuraje. The project is planned for 2026–2028 and includes collaboration with Prof. Chang Yan of The Hong Kong University of Science and Technology (Guangzhou). The collaboration adds a strong photovoltaics dimension to the team's hydrogen portfolio and broadens its international research network.

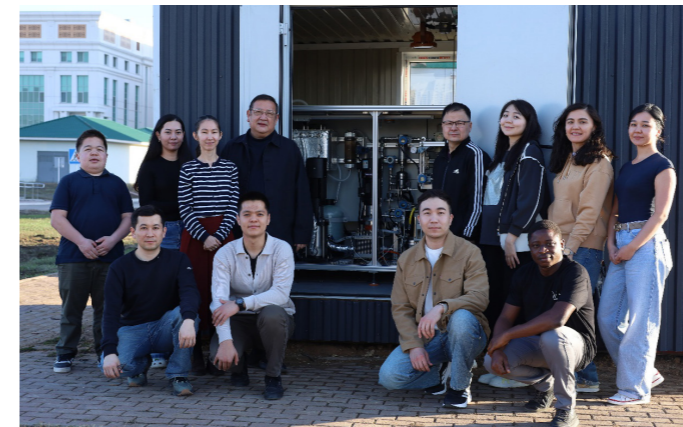


Photo 1: The hydrogen production and storage team, together with Prof. Nuraje, standing beside the green hydrogen production system.



Photo 3: The catalyst material developed for the electrolyzer, together with the resulting research outputs, including research papers, patents, and monographs



THE ROAD TO COMMERCIALIZATION

The team's next steps are focused on improving efficiency, durability, and scalability. Future work will target better materials and catalysts, optimized system architectures, lower hydrogen production costs, and improved storage approaches, including safer and more compact solutions. The group is also preparing the next commercialization stage and seeking an industrial partnership to help move the technology closer to market.



HYDROGEN PRODUCTION TEAM

- Dr. Yerbolat Magazov (group leader)
- Dr. Nursaya Zhumabay
- Dr. Vladislav Kudryashov
- Assel Rakymbekova, PhD student
- Zhanar Sholanbayeva, PhD student
- Asset Aliyev, MSc student
- Zhamilya Taubaldiyeva, MSc student
- Oluwatobi Akinwale, MSc student
- Yerniyaz Zhangaliyev, BSc student

HYDROGEN STORAGE TEAM

- Dr. Aitkazy Kaisha (group leader)
- Madina Kalibek, PhD student
- Botakoz Suleimenova, PhD student
- Aigerim Ospanova, PhD student
- Talgat Orazbek, Research Assistant

PARTIAL REPROGRAMMING: FROM DRAWING BOARD TO CLINICAL TRIALS



ID Professor Prim Singh



In a feature article in *Nature* journal on 9th April Professor Prim Singh's work on turning back the "ageing clock" by "partial reprogramming" has been recognized. Here, he writes about historical background to partial reprogramming, the work he doing in the Medical School and the opportunities opened up at Nazarbayev University and Kazakhstan.

Work initiated in my Laboratory is moving towards clinical trials and generating significant investments in Biotech companies. The high interest has been reviewed recently in a Feature Article in *Nature*¹ – it is also flagged on the front cover!

The partial reprogramming breakthrough builds on discoveries that have been pivotal in the global development of regenerative medicine. Two seminal discoveries were awarded jointly the 2012 Nobel Prize in Physiology and Medicine, to Sir John Gurdon and Shinya Yamanaka; Gurdon was Master of Magdalene College, Cambridge University, which is where I was a graduate student. Gurdon and Yamanaka showed that specialised, differentiated, cells could undergo "nuclear reprogramming" to re-acquire developmental potential, that is to form cells that now have potential to make many different cell types (they become pluripotent NT-ES/iPS cells; top row in Figure 1). Gurdon did this by cloning frogs, where the nucleus of a differentiated intestinal cell from a tadpole was transferred into an enucleated egg from which the mother's DNA had been removed (somatic cell nuclear transfer; SCNT). The reconstructed embryo could recapitulate the whole of embryonic development producing cloned tadpoles and subsequent experiments yielded adult frogs². Yamanaka identified *Oct4*, *Sox2*, *Klf4* and *c-Myc* (OSKM) "reprogramming factors" that, when introduced into differentiated cells, could "reprogram"

them into induced pluripotent stem (iPS) cells³ (to row, Figure 1).

The World's imagination was captured by a third discovery, cloning of "Dolly-the-sheep"⁴. This extended Gurdon's work to mammals. Dolly was "created" using a nucleus of an udder cell from a middle-aged six-year-old ewe. The nucleus was inserted into an enucleated oocyte and after an unremarkable pregnancy "Dolly" was born. This showed that an old cell could also undergo nuclear reprogramming after SCNT, pass through an embryonic stage and recapitulate the whole of development giving rise to a new-born clone. Likewise, old cells from an 82-year-old donor can also undergo nuclear reprogramming to iPS cells using Yamanaka's "reprogramming factors"⁵ (middle row, Figure 1).

Dolly was cloned at the Roslin Institute in Edinburgh where I set up the first Nuclear Reprogramming Laboratory. There, I came up with the notion that nuclear reprogramming after SCNT results in both developmental and age reprogramming. The idea came from the simple observation that although Dolly was derived from an old nucleus there she was, a lamb. She was not born old like Benjamin Button from F. Scott Fitzgerald's short story⁶. I drew the conclusion that "developmental reprogramming" of an old, differentiated, cell to an embryonic cell occurs seamlessly with "age reprogramming" – rejuvenation of the old cell

where the ageing clock is reset to zero. But this begs the question: is developmental reprogramming separable from age reprogramming? Put another way, can an old differentiated cell be rejuvenated without passage through an embryonic stage? We tested this hypothesis and found that "partial reprogramming" by transient expression of OSKM reprogramming factors could rejuvenate old differentiated cells without going through an embryonic stage; they were rejuvenated without loss of their differentiated, specialised, characteristics; developmental and age reprogramming are indeed separable⁸ (see bottom row in Figure 1).

As mentioned in the *Nature* article, *in vivo* studies in aged mice have shown that organs and tissues, including brain, muscle, pancreas, lungs, spleen, kidney and skin can be rejuvenated by partial reprogramming. Remarkably, lifespan of mice can also be extended. Partial reprogramming can bring about whole body rejuvenation! In short, partial reprogramming is a robust scientifically proven method for rejuvenating old cells. This has been confirmed by many groups, including those at Cambridge, Stanford and Harvard universities.

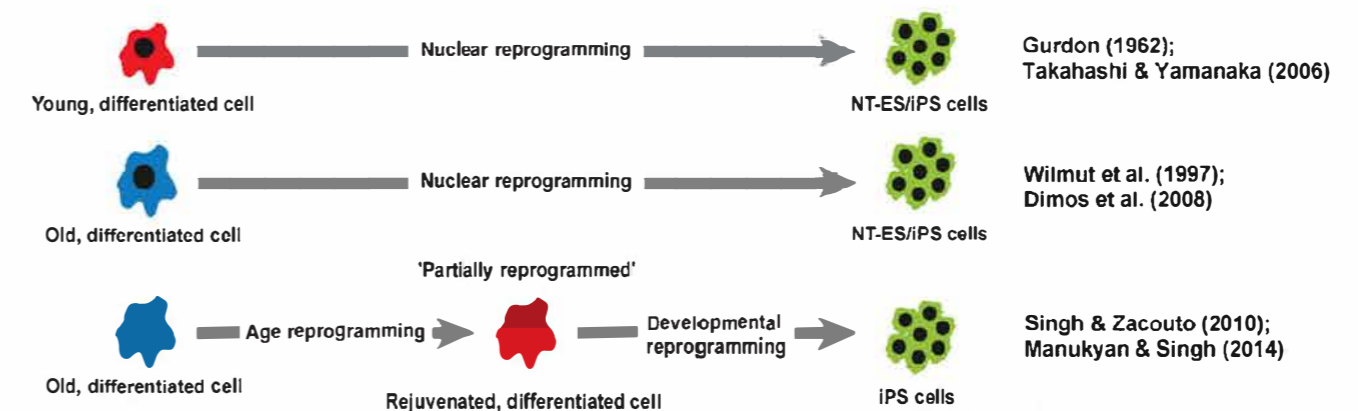


Figure 1: Key experiments leading to the discovery of "partial reprogramming"⁹. **Top row**, shows work of Gurdon² and Takahashi and Yamanaka³. Using somatic cell nuclear transfer (SCNT) in *Xenopus laevis* it was shown that fully differentiated intestinal cells from feeding larvae could support the development of normal muscle and nerve cells after transplantation to enucleated eggs². The differentiated cells underwent nuclear reprogramming through an embryonic (nuclear transfer embryonic stem cells; NT-ES cells) stage after SCNT. Work in mice showed that after introduction of *Oct4*, *Sox2*, *Klf4* and *c-Myc* (OSKM) "reprogramming factors" into embryonic fibroblasts or tail-tip fibroblasts from young male (7-week-old) and female (12-week-old) mice, the cells underwent nuclear reprogramming resulting in induced pluripotent stem (iPS) cells³. **Middle row**, shows the work on "Dolly-the-sheep" by Wilmut et al.⁴, and that on human iPS cells by Dimos et al.⁵. Dolly was the first mammal cloned from a cell from an adult animal. She was derived from a 6-year-old mammary gland epithelial cell by SCNT. 29 of 277 reconstructed embryos that developed to the blastocyst stage (that contain NT-ES cells) were implanted into surrogate Scottish Blackface ewes³. One gave rise to a live lamb, Dolly. iPS cells were generated after introduction of OSKM reprogramming factors into skin fibroblasts collected from an 82-year-old patient⁵. **Bottom row**, shows the work of Singh and Zacouto⁷ and Manukyan and Singh⁸. It was hypothesized⁷ that nuclear reprogramming could be separated into age reprogramming and developmental reprogramming. The test was to introduce OSKM "reprogramming factors" into an old cell (in blue) characterized for age-related markers and during the trajectory from old cell to iPS cell (in green), a search would be made for a "partially reprogrammed" stage where the marker(s) were reduced or lost, while retaining the differentiated characteristics of the cell (in red)⁷. This was indeed shown to be the case. "Partially reprogrammed" cells were rejuvenated without de-differentiation to an embryonic (iPS) stage⁸.

WHAT DOES THE COMMERCIAL LANDSCAPE LOOK LIKE?

The ultimate goal of "partial reprogramming" is to enhance healthy lifespan in humans. To live longer, more healthy, lives. Huge efforts are being made to reach this goal. As noted in the *Nature* article billions of dollars are being invested by "Silicon Valley's tech elite" in partial reprogramming. Jeff Bezos of Amazon fame has also invested \$3 billion dollars in a new start up, Altos Labs⁹. These investments represent the largest ever made in Biotech¹. FDA approval for clinical trials to restore sight in glaucoma patients has further galvanized interest in partial reprogramming¹.

WHAT ARE WE DOING?

Our work is funded by internal grants and grants from the Ministry of Science and Higher Education. We are using this funding to make progress in three areas, which will be important for clinical applications of OSKM-driven partial reprogramming:

First, dynamics of partial reprogramming. We are investigating dynamics of partial reprogramming in tissues taken from old (~60 years old) and very old (~80 years old) patients. Using this approach, we will obtain an answer to the question: when cells of different ages are subject to partial reprogramming are they rejuvenated at the same or different rates? This information is important for clinical applications.

If rejuvenation is dependent upon the age of the patient, different pro-tocols will need to be tailored to ensure that rejuve-nation is efficacious, notwithstanding whether the pa-tient is old or very old.

Second, rejuvenation of the ageing brain. Decline in neuronal function leads to age-related cognitive and neuropsychiatric disorders that significantly limit indi-vidual capacity, even when other organs remain rela-tively preserved. Here, we will investigate the partial reprogramming of old human neurons. Human fibro-blasts will be subject to direct reprogramming to gen-erate human neurons that retain the age-related char-acteristics present in the parental fibroblasts. Notably, novel methods that introduce “OSKM reprogramming factors” without leaving a genomic “footprint” will be used, thereby avoiding the use of vectors that could integrate into the genome and cause mutation.

Third, biophysics of epigenetic rejuvenation. Age-dependent epigenetic alterations are a key hall-mark of ageing. Rejuvenation of epigenetic alterations is termed epigenetic rejuvenation. If epigenetic rejuvenation is stopped partial reprogramming of all hall-marks fails; *epigenetic rejuvenation is a “driver” of partial reprogramming*. Any clinically-relevant therapy must ensure that the epigenome is rejuvenated. In a novel synthesis of epigenetics, neural network ma-chine learning and polymer physics I showed there is a mathematical relationship between the strength of interaction between epigenetically-marked chromatin domains and the age of the cell.¹⁰

REFERENCES

- Ledford H. This method to reverse cellular age-ing is about to be tested in humans. *Nature*. 2026, 652(8109):291-293. <https://doi.org/10.1038/d41586-026-01024-7>
- Gurdon JB. The developmental capacity of nuclei taken from intestinal epithelium cells of feeding tad-poles. *J Embryol Exp Morphol*. 1962 Dec;10:622-40. PMID: 13951335.
- Takahashi K, Yamanaka S. Induction of pluripo-tent stem cells from mouse embryonic and adult fibroblast cultures by defined factors. *Cell*. 2006 Aug 25;126(4):663-76. <https://doi.org/10.1016/j.cell.2006.07.024>
- Wilmut I, Schnieke AE, McWhir J, Kind AJ, Camp-bell KH. Viable offspring derived from fetal and adult mammalian cells. *Nature*. 1997, 385(6619):810-3. <https://doi.org/10.1038/385810a0>
- Dimos JT, Rodolfa KT, Niakan KK, Weisenthal LM, Mitsumoto H, Chung W, Croft GF, Saphier G, Lei-bel R, Goland R, Wichterle H, Henderson CE, Eggan K. Induced pluripotent stem cells generated from patients with ALS can be differentiated into motor neurons. *Science*. 2008, 321(5893):1218-21. <https://doi.org/10.1126/science.1158799>

Strength of these interactions decreases as cells age making the (epi) genome more disorganised. Partial reprogramming re-juvenates the epigenome and reverses the disorganisation. Biophysical understanding of the process will advance directed epigenetic rejuvenation therapies, which are essential for partial reprogramming of old cells.

WHAT ARE THE OPPORTUNITIES FOR NAZARBAYEV UNIVERSITY AND KAZAKHSTAN?”

Using the *Nature* article¹ as a spur, there is now an opportunity to bring together a critical mass of scien-tists at NU that work on ageing, including partial repro-gramming. In this way, rather than waiting for others to capitalise on our initiative – to then licence partial reprogramming technologies back to us at great cost – a concerted effort should be made to encourage in-vestments from entrepreneurs and industrial partners in Kazakhstan, similar to those described in the *Nature* article, to develop technologies here for the benefit of Kazakhstan’s economy. A concentration of talent at NU will also advance training of excellent young Ka-zakhstani scientists in a topic that has fascinated humans for millennia – the “Holy Grail” of healthy lifespan extension.

- F. Scott Fitzgerald (2008). *The Curious Case of Benjamin Button and Other Jazz Age Stories*. Pen-guin Classics. ISBN 978-0-14-310549-7.
- Singh PB, Zacouto F. Nuclear reprogramming and epigenetic rejuvenation. *J Biosci*. 2010, 35(2):315-9. <https://doi.org/10.1007/s12038-010-0034-2>
- Manukyan M, Singh PB. Epigenome rejuvenation: HP1 β mobility as a measure of pluripotent and se-nescent chromatin ground states. *Sci Rep*. 2014, 4:4789. <https://doi.org/10.1038/srep04789>
- Paine PT, Nguyen A, Ocampo A. Partial cellular re-programming: A deep dive into an emerging rejuve-nation technology. *Aging Cell*. 2024, 23(2):e14039. <https://doi.org/10.1111/ace1.14039> See: (i) section 3 on “Cellular reprogramming”, especially second paragraph; (ii) the time-line in Figure 1 (especially positions 4 and 6, counting from top); (iii) the com-mercial landscape in section 9 – you’ll see that Jeff Bezos is now investing in partial reprogramming!
- Singh PB. A Biophysics of Epigenetic Re-juvenation. *Cells*. 2025, 14(16):1249. <https://doi.org/10.3390/cells14161249>
- Abuova N. Can Aging Be Reversed? *Astana Times*. <https://astanatimes.com/2026/04/can-ag-ing-be-reversed/>

NU RESEARCHERS HONORED WITH NATIONAL SCIENCE AWARDS

Nazarbayev University researchers were recognised at a national ceremony in Almaty celebrating leading contributors to science and higher education.



The awards were presented by Minister of Science and Higher Education **Sayasat Nurbek**, President of the National Academy of Sciences **Akhylybek Kurishbayev**, and Vice Minister **Gulzat Kobenova**.

NU scholars received state prizes named after **Sh. Ualikhanov** and **D. Kunayev**. The awards went to **Dina Sharipova**, Associate Professor at the Graduate School of Public Policy, and **Zhanat Kappassov**, Associate Professor at the School of Engineering and Digital Sciences.

State research scholarships for talented young scientists were awarded to **Almagul Mentbayeva**, **Azamat Yeshmukhametov**, **Berikbol Dukekeyev**, and National Laboratory Astana re-searchers **Sholpan Askarova**, **Olzat Toktarbayuly**, **Aliya Mukanova** and **Munziya Abutalip**.

Eight NU researchers also received the national “Best Re-searcher” award: **Aishuak Konarov**, **Ardak Kashkynbayev**, **Alexander Arbutz**, **Ayaulym Belgibayeva**, **Batukhan Tatyka-yev**, **Bauyrzhan Umbayev**, **Dauren Yerezhepov** and **Olzat Toktarbayuly**.

Nazarbayev University congratulates all awardees and thanks them for their contribution to advancing science in Ka-zakhstan.

BEHIND THE RESEARCH

In-depth stories behind discoveries, fieldwork and scientific progress at Nazarbayev University.

RETHINKING NUTRITION SCIENCE FOR CENTRAL ASIA'S POPULATION HEALTH



ID Dr. Mei Yen Chan
Assistant Professor,
School of Medicine

The Central Asia Food Innovation Laboratory is building the region's first data-driven food-agriculture ecosystem. We spoke with the team about AI-powered dietary tools, hyperspectral food analysis, and opening the first experimental restaurant in Central Asia.



ACTIVE ONGOING PROJECTS:

TAYQAZAN: Developing novel Central Asian Artificial Intelligent Food Systems (AIFRS) for predicting metabolic responses and the deployment on wearable devices

APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) IN FOOD RECOGNITION: Creating the first Central Asia Food Scenes Dataset for delivering personalized nutrition and health promotion in Kazakhstan

3D-FOODPRINT: Characterizing Applications of Functional Protein-Based 3D Food Inks for Sustainable Resourcing in Agri-Food Systems with a Focus on Buckwheat Proteins

The Central Asia Food Innovation Laboratory, CAFI Lab, is a research group at Nazarbayev University focused on nutrition science, food technology, and AI, with a specific lens on Central Asia. That regional focus is deliberate and sits at the heart of everything we do.

The core problem is a gap: Central Asia has been largely invisible in global nutrition research. The datasets, dietary tools, and AI systems that exist were built on other regions' food cultures. When you try to apply them here, they don't fit. The foods are different, the eating patterns are different, and the languages are dif-

ferent. We are building the scientific infrastructure that actually reflects how people in this region eat and live.

Beyond the data gap, we are also rethinking how nutrition is studied, moving from isolated nutrients toward a systems-level understanding that connects traditional food culture, modern dietary patterns, metabolic health, and emerging technologies like AI. The lab brings together nutrition scientists, engineers, and data scientists to work on that intersection.

THAT SYSTEMS-LEVEL APPROACH: WHAT DOES IT ACTUALLY LOOK LIKE IN PRACTICE?

Traditional nutrition research tends to zoom in on single compounds, how many calories, how much iron, how much vitamin D. However, that misses how people actually eat. Food is cultural. It is mixed meals at a family table, shaped by tradition, and rapidly changing lifestyles. Our approach is to study diet as a system: how traditional foods, modern eating patterns, and metabolic health interact together.

In practical terms, that means integrating AI tools, experimental food products, and region-specific datasets into a single research model. Each element feeds the others: the datasets train the AI, the AI informs dietary assessment, and the food experiments generate new data. It is a loop rather than a linear pipeline.

You have been studying how tools like ChatGPT perform in clinical nutrition contexts. What have you found?

The results are genuinely promising in some areas and sobering in others. On the positive side, AI systems can generate tailored dietary recommendations that align well with clinical guidelines. For one of our studies, we focused on [chronic kidney disease](#), which involves complex, condition-specific nutrition needs. That is a meaningful capability for scaling personalized nutrition advice.

We also uncovered a critical limitation in LLMs' ability to provide dietary recommendations: [linguistic disparity](#). ChatGPT performs well in English and Russian, but not in Kazakh, simply because the training data for Kazakh is sparse. This is not a minor gap. It means the technology, as it currently stands, is not equitably usable across regions. Clinical validation and culturally adapted data systems are not optional. They are prerequisites for any of this to be useful in practice. Our work was also quoted as one of the first few studies that have a robust evaluation rubric for assessing dietary recommendations.

One of your study involves apple jam and hyperspectral imaging, which sounds exciting. What is the connection?

Sugar is commonly found in processed foods. In this study, we used apple jam, a widely consumed product in Kazakhstan. We applied hyperspectral imaging combined with machine learning to non-destructively assess sugar content across 204 spectral bands, achieving a predictive accuracy of $R^2 = 0.95$. This work has the potential to be developed into commercial detection sensors for measuring sugar content in processed foods.

What that means practically is a rapid, precise method that does not require destroying the sample, unlike traditional lab approaches. It links food composition directly to data science and AI, and points toward how food quality assessment and regulation could evolve in modern food systems.

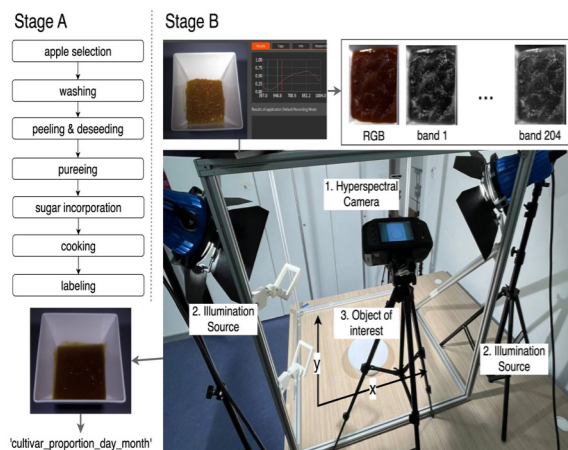


Figure 1. Experimental workflow: sample preparation (Stage A) and hyperspectral imaging setup (Stage B) for non-destructive sugar analysis (204 bands). (Lissovoy et al., 2025).

Central Asia has historically been underrepresented in global nutrition databases. How is the lab addressing that?

That gap is exactly what motivated two of our major dataset projects. The first, the [Central Asian Food Dataset](#), includes over 16,000 images across 42 traditional foods, with food classification accuracy of around 88.7%. That alone was a significant step.

A [newer dataset](#) goes further: more than 21,000 images, 239 food categories, and approximately 70,000 labeled instances capturing real-life mixed meals. The emphasis on mixed meals matters. It reflects how people actually eat in this region, not idealized single-ingredient portions.

In parallel, the lab has contributed to portion estimation research through [the Food Portion Benchmark \(FPB\) dataset](#), a comprehensive and diverse collection comprising 14,083 images across 138 food classes, each with manually annotated bounding boxes and laboratory-measured component weights.

Together, these datasets enable AI-based food recognition and dietary assessment that actually reflect Central Asian eating patterns. Without region-specific data, any AI nutritional tool applied here is essentially operating on assumptions built from other cultures' diets.

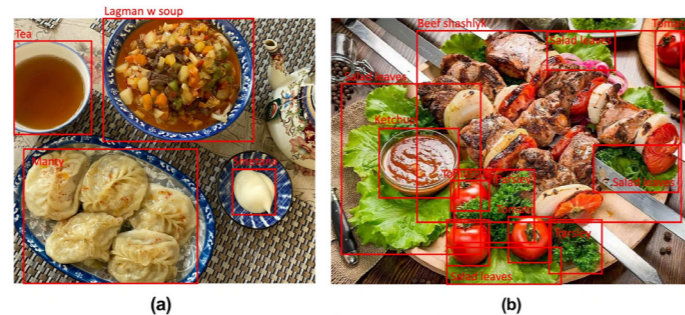


Figure 2. Example annotations for food dataset preparation ((Karabay et al., 2025).

The lab has been presenting this work at international conferences. What reception have you had, and what conversations is it opening up?

The reception has been strong, and it speaks to a wider appetite for region-specific contributions to global nutrition science. We have been invited to present at the Nutrition 2025 in USA, the International Summit on Food, Nutrition and Health in India, the UK, ICMHI 2025 in Japan, and IEEE ICIP 2025 in the USA, as well as regional forums like the Silk Road Food Systems Forum and the 1st International Nazarbayev University Planetary Health Conference.

The conversations that keep emerging are around AI in precision nutrition, data-driven food systems, and how to preserve traditional food knowledge while integrating new technologies. The CAFI Lab's role is to be a bridge, ensuring Central Asian food systems are represented in the emerging digital and scientific frameworks being built globally, not just studied locally.



You recently helped to set up an experimental restaurant at Nazarbayev University. What is the idea behind the FoodLab, and what happened at the opening?

On March 27, we helped to set up the Food Lab and experimental restaurant at the main campus, the first of its kind in Central Asia. The Food Lab is where research becomes experience. The underlying concept is food as medicine: using AI, nutrition science, and engineering to translate data-driven insights into practical, culturally relevant solutions that people can actually engage with.

At the opening, guests explored health tracking, including body composition analysis, immersive digital tools, food 3D printing, and interactive taste and preference experiments. It was designed to be a space where science is not behind glass but something you can taste, measure, and interact with.

As part of a broader ecosystem focused on wellbeing and discovery, the FoodLab is the bridge between what happens in our lab and what ends up on your plate.



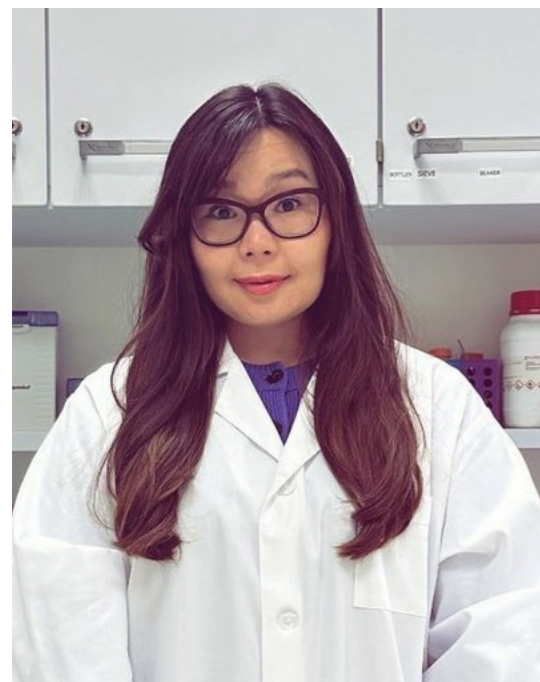
The lab recently took the research out of the university and into hospitals in other parts of Kazakhstan. What was the purpose of that trip, and what did the team actually do on the ground?

From March 10 to 13, the research team travelled to Shymkent and Turkestan for a research trip focused on clinical nutrition and nutritional support in patients. It was an important shift in mode, from generating data to engaging directly with the clinicians to improve health outcomes for patients.

We visited four major medical institutions: the Heart Center Shymkent, City Clinical Hospital No. 1, City Clinical Hospital No. 2, and Shymkent Regional Clinical Hospital. Across those visits, the team ran seminars and workshops on perioperative and postoperative nutrition, delivered a practical workshop on the malnutrition screening tool, and reviewed hospital dietary schedules and kitchen operations firsthand. As part of these activities, we also presented the [Central Asian Digital Visual Food Atlas](#) and shared sample materials with clinicians, demonstrating its application in clinical settings.

We also spent time exploring joint research partnerships with clinicians from Akhmet Yassawi University. The trip ended with a visit to Turkestan, one of Kazakhstan's most historically significant cities. It carried particular meaning for us as a symbolic connection to the TayQazan project, an ongoing work on AI-based food systems and metabolic prediction, which is deeply rooted in the region's food heritage.

RENDERING THE INVISIBLE VISIBLE: HOW NU RESEARCHERS DECODE ASTANA'S PM_{2.5} POLLUTION



Behind the Research with the Air Quality & Aerosol Science Research Team

Kazakhstan continues to rely on an outdated Soviet-era system of Maximum Permissible Concentrations (MPCs), which offers weaker health protection than current WHO air-quality guidelines. This approach originated in the Soviet sanitary-hygienic system of the mid-20th century and has remained in use for decades. For PM_{2.5}, the national one-time limit of 160 µg/m³ is 32 times higher than the WHO annual guideline of 5 µg/m³, while the 24-hour limit of 35 µg/m³ is 2.3 times higher than the WHO guideline of 15 µg/m³.

ID Interview with Dr. Gulden Ormanova - Senior Researcher, Group Leader, PI of the project, [RE Laboratory, NLA](#)

What invisible problem were you trying to reveal, and why does it matter for Kazakhstan and beyond?

We were trying to reveal the hidden chemical composition of air pollution in Astana: not only how much fine particulate matter is present in the air, but what these particles are made of, where they come from, and why pollution episodes can persist over the city for several days.

Air pollution is often noticed only when it becomes visible such as haze, smoke, or reduced visibility. However, the most harmful fraction is usually invisible. PM_{2.5} particles are small enough to penetrate into the lungs, while black carbon, a combustion-related component of PM_{2.5}, is important for both health and climate because it absorbs sunlight and contributes to atmospheric warming.

This work is important because Central Asia (CA) has long remained a blank spot on the global air-quality map. Before our study, Kazakhstan had no published PM_{2.5} source apportionment results and no reported Black Carbon (BC) measurements. Working with international collaborators from Clarkson University and the University of Rochester Medical Center, under the supervision of Professor Philip K. Hopke, we helped fill this knowledge gap and demonstrate how air pollution forms and intensifies in Astana.

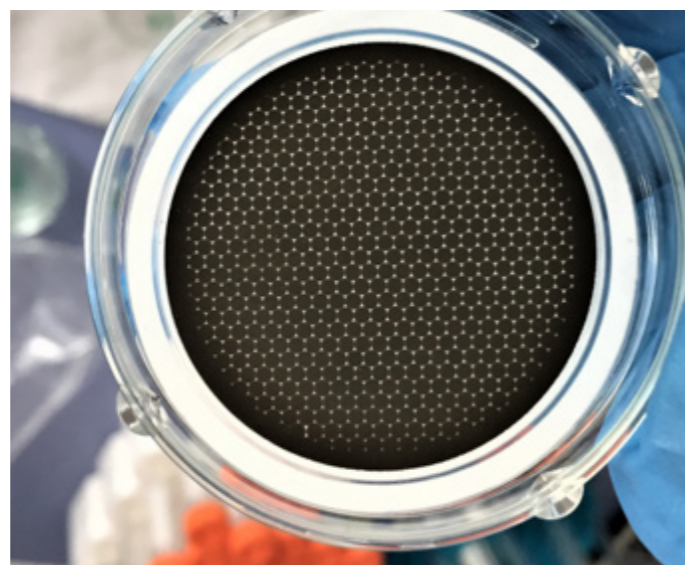


Figure 1. PM_{2.5} particles collected on a filter after 24-hour ambient air sampling in Astana

As one of the world's coldest capitals, Astana has especially high heating demand. At the same time, its population has grown from under 300,000 to roughly 1.5 million in 25 years, increasing demand for energy, transport, housing, and infrastructure, all of which intensify urban emissions. Our analysis of nearly two years of PM_{2.5} filter samples, collected on PTFE and quartz filters from November 2019 to August 2021,

showed an average PM_{2.5} concentration of **23.43 ± 11.50 µg/m³**. The highest daily value, **63.8 µg/m³**, was recorded in January during the heating season. Black Carbon (BC) study measured an average BC concentration of **2.56 ± 1.29 µg/m³** in Astana, with the highest monthly mean in January, and showed that combined heat and power plants were a major source.

A further invisible driver is meteorology. Earlier work showed that, in Astana, meandering atmospheric circulation patterns and atmospheric blocking can generate winter anticyclones and summer heatwaves. In the BC study, 36 episodic periods were identified, including 18 during the heating season and 18 during the non-heating season, with 9 Rex blocking and 27 Omega blocking events. These stagnant conditions suppress atmospheric ventilation and trap emissions near the surface for several days, transforming local emissions into severe multi-day pollution episodes with concentrations up to four times higher than annual averages.

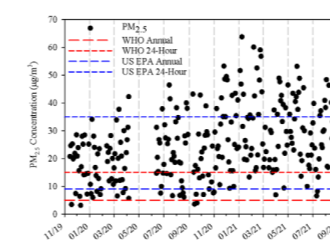


Figure 2. Two different types of atmospheric blocking based on point vortex theory: Ω blocking (a, b) and Rex (high-over-low) blocking (c, d).



Figure 3. Time series of PM_{2.5} (µg/m³) measured in Astana Kazakhstan and the WHO guideline levels (WHO, 2021) and the U.S. EPA NAAQS limits (USEPA, 2024).

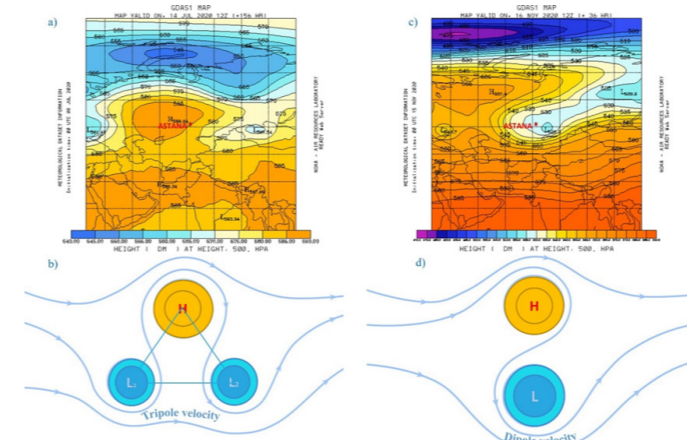


Figure 4. Sampling and monitoring site (Thermo Scientific Partisol, DIGITEL DPA14, and Aeroqual AQM 65)

What did your research uncover that the scientific community or policymakers did not fully understand before?

The key breakthrough was that this study provided the first PM_{2.5} chemical composition and source-apportionment analysis in Kazakhstan. Before this work, policymakers knew that PM_{2.5} levels were high, but

they lacked sufficient scientific evidence to identify which sources were responsible. We addressed this gap by measuring elements, water-soluble inorganic ions, black carbon, and PM_{2.5} mass, followed by Positive Matrix Factorization analysis to identify major source contributions. The results showed that the largest contributor to PM_{2.5} was spark-ignition vehicle emissions, accounting for 30.3% of PM_{2.5} mass. Other major contributors were coal fly ash at 17.1%, secondary nitrate at 15.1%, primary sulfate from fuel combustion at 9.9%, secondary sulfate from coal combustion at 8.5%, soil and road dust at 7.9%, diesel emissions at 7.1%, and local power plants at 4.2%.

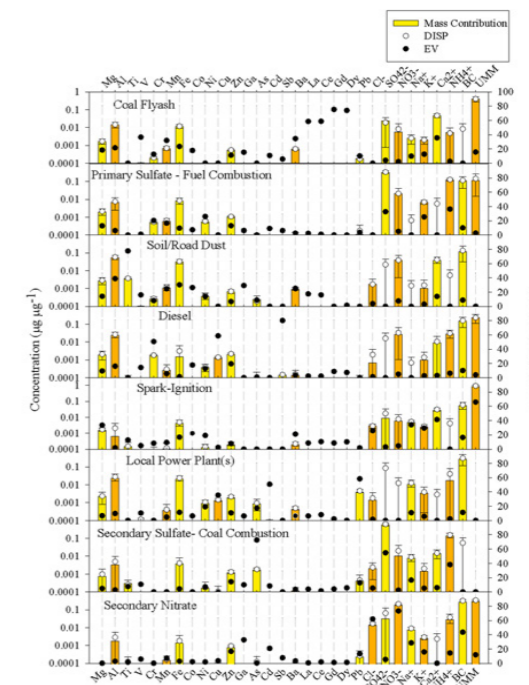
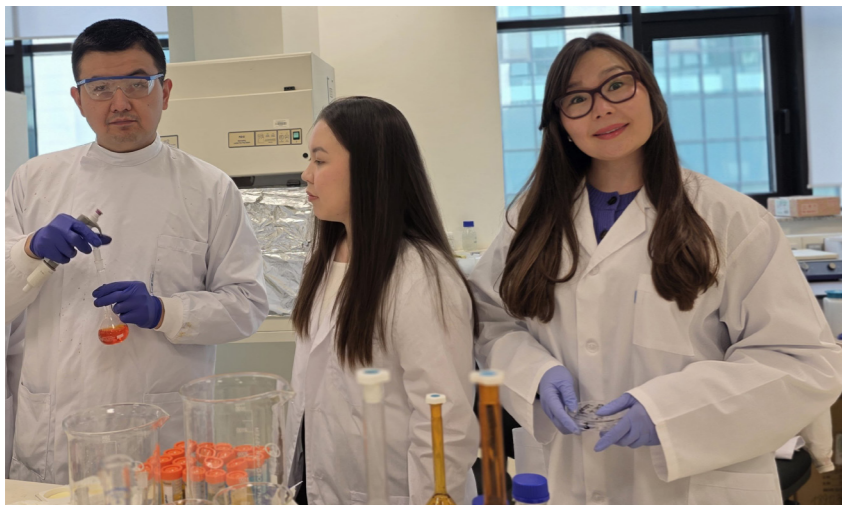


Figure 5. The PMF model base run concentration profiles (columns, scale on the left axis) and the explained variance (solid circles, scale on the right axis) for factors influencing ambient PM_{2.5} concentrations in Astana, are depicted.

How does this research change the way we should think about air pollution, from a local problem to a systems challenge shaped by climate, energy and atmospheric forces?

This research shows that air pollution is not only an emissions problem. It is the result of an interaction between atmospheric chemistry, weather conditions, energy systems, and urban activity. In winter, Astana's energy demand increases because of heating. At the same time, cold-season meteorology can reduce atmospheric mixing. Anticyclones, atmospheric blocking, and shallow boundary layers can trap pollutants near the surface. This means emissions from vehicles, coal combustion, boilers, and power plants can accumulate instead of dispersing. Therefore, air pollution should be understood as an urban-energy-atmosphere system. Emissions create pollutants, but meteorology controls when and how severely they accumulate. This is especially important for cold continental cities, where winter heating and atmospheric stagnation occur at the same time.



looking at the same pollutant over time. By having source-specific PM, you can track the effect of specific source types or atmospheric processes and the ones associated with the adverse health outcomes can be targeted to provide effective and efficient pollutant reductions and improved public health.

RESEARCH TEAM MEMBERS LIST:

- Dr. Gulden Ormanova - Senior Researcher, PI, Group Leader (Website https://nla.nu.edu.kz/air_quality)
- Dr. Alexey Alexeyev - Senior Researcher, Epidemiologist
- Alexandra Vinnikova - Research Assistant
- Sholpan Orazbaeva - MSc student
- Kyran Kassym - Research Assistant
- Darina Bibatyrova - MSc student, SEDS
- Yestay Bakhyt - MSc student

SELECTED PUBLICATIONS

- Ormanova, G., Hopke, P.K., Dhammapala, R., Ozturk, F., Shah, D., Torkmahalleh, M.A. (2025). Chemical characterization and source apportionment of atmospheric fine particulate matter (PM2.5) at an urban site in Astana, Kazakhstan. *Atmospheric Pollution Research*, 16, 102324.
- Ormanova, G., Hopke, P.K., Darvishi Omrani, A., Zhakiyev, N., Shah, D., Torkmahalleh, M.A. (2024). Particulate black carbon mass concentrations and the episodic source identification driven by atmospheric blocking effects in Astana, Kazakhstan. *Science of the Total Environment*, 939, 173581.
- Ormanova, G., Karaca, F., Kononova, N. (2020). Analysis of the impacts of atmospheric circulation patterns on the regional air quality over the geographical center of the Eurasian continent. *Atmospheric Research*, 237, 104858.

If your findings were translated into policy or practice, what real-world impact could they have on cities, public health and climate action?

If translated into policy, these findings could help cities move from broad pollution control to source-specific action. Instead of treating PM_{2.5} as one general pollutant, authorities could focus on the sources. For public health, reducing PM_{2.5} and BC would lower exposure to particles associated with respiratory and cardiovascular risks. Such reductions are especially important for children, older adults, and people with asthma or heart disease.

First, accelerate natural gas pipeline expansion and subsidize household connections. In many cities, coal heating in the private residential sector remains a major PM_{2.5} source because coal is still the cheapest option, while connecting a house to the gas network is often expensive. Local authorities should offer discounts, subsidies, or co-financing to help households switch from coal to gas. Second, strengthen vehicle emission standards. Kazakhstan has a large fleet of older vehicles and many older vehicles remain mechanically functional but environmentally damaging because catalytic converters and DPF were often removed. Policies should enforce emission controls, promote Euro V/VI-quality gasoline and diesel vehicles with better quality fuels, and phase out the most polluting vehicles. Third, local air-quality regulations, standards, and enforcement mechanisms must be updated, policy should be based on health-protective limits, continuous monitoring, source-specific emission control, and transparent public reporting.

WHAT LARGER SCIENTIFIC FRONTIER DOES THIS WORK OPEN, AND WHAT QUESTIONS COME NEXT?

Prof. Philip K. Hopke: There are several aspects that can be pursued. Only Astana has had source apportionment so other major cities need to have sampling, chemical analysis, and data analysis to provide equivalent information. It would be good to develop a long-term chemical speciation network so that changes in air quality generated by the policy-driven reductions in emissions can be tracked. It is important to know if implemented policies are actually working (accountability studies). Finally, source apportionment allows epidemiological studies to relate adverse health outcomes with source-specific pollutants. Particulate matter (PM) is not a well-defined pollutant. Ozone or carbon monoxide are specific chemical compounds that are the same anywhere they are measured. However, PM is a mixture of mixtures where the sub-mixtures are the specific source emissions or particle types formed in the atmosphere like ammonium sulfate. Thus, health effects studies of PM are not

CENTRAL ASIA'S GULAG: FIELDWORK IN VOLKOVSKOE, KARAZHAR, AND MANZHI

As part of a Collaborative Research Project between Nazarbayev University and Karaganda Buketov University, a research project titled "Central Asia's Gulag: Mapping and Managing Penal Heritage in Kazakhstan" (CAG project) continues to make progress in uncovering and preserving Kazakhstan's penal heritage. It examines the impact of the Gulag era penal systems on Kazakhstan's socio-economic development.



SCHOOL OF SCIENCES AND HUMANITIES



GRADUATE SCHOOL OF PUBLIC POLICY

The project is led by **Dr. Gavin Slade** as a Principal Investigator (SSH), **Dr. Katherine M. Erdman** as a Director of Field Research (SSH), and **Dr. Aziz Burkhanov** (GSPP).

TWO FUNDAMENTAL RESEARCH QUESTIONS GUIDE THE CAG PROJECT'S INQUIRY:

- 1 What impact have the geography and practices of punishment historically had on Kazakhstan's economic and social development?
- 2 How can this historical geography be studied and preserved?

These questions are essential for understanding the vital, but often overlooked, history of Kazakhstan's penal system and its lasting presence in the landscape.



Fig. 1. Remains of steam-powered water pumping station constructed by Karlag prisoners.

FIELDWORK IN KARAZHAR

In May-June 2025, a team of 13 researchers made up of faculty and students of the Sociology and Anthropology Department from Nazarbayev University spent three weeks conducting extensive archaeological research in the villages of **Volkovskoe** and **Karazhar** and adjacent **Manzhi** in the Karaganda Oblast. Karazhar was a Gulag camp that served as the administrative centre of the Karazhar subdivision of Karlag. The camps of Volkovskoe and Karlag. The camps of Volkovskoe and Manzhi fell under its governance. Prisoners within these camps engaged in growing and preserving fruits and vegetables, as well as animal husbandry. Important Gulag-era structures still stand here today, including the remains of a steam-powered water pumping station (Fig. 1) and a factory which preserved food for frontline soldiers during World War II.

WITH THE SUPPORT OF LOCAL AKIMAT'S OFFICE AND VILLAGERS, THE RESEARCH TEAM CONDUCTED:

- Surveys of the geographic extent and layout of the camp, including prisoner-built water management systems and irrigation channels;
- Small-scale excavations to identify construction techniques used in a prisoner barrack and a possible officer's house;
- Full archeological documentation of key Gulag-era structures;
- Sociological interviews with local residents to get insight into oral histories and local perceptions of Karlag's presence in their community.

The team also travelled to neighbouring camp sites to document a punishment block and to learn about the Valley of Death, a path where a large convoy of prisoners and guards perished.

In addition to the archaeological research, the team organized an interactive seminar for local schoolchildren, introducing them to the basics of archaeology (Fig. 2). Also, some members of the team participated in a conference at the Karlag Museum and attended the Day of Remembrance of the Victims of Political Repression on 31st May, 2025.



Fig. 2. Students from Nazarbayev University leading interactive archaeology activities for children during the fieldwork.

KEY FINDINGS AND RECOMMENDATIONS

Volkovskoe was divided into two zones, north and south. The north zone contained a punishment block and a water pumping station, while the south zone held many different buildings, including barracks, officers' housing, and a factory. The two zones were separated by large agricultural fields. The ruins at Manzhi, in turn, contain a mix of gulag-era and sovkhos-period remains. It is important to tell them apart in order to preserve reliable archaeological and architectural knowledge about the organisation of Karlag. In the village of Karazhar, a modern settlement was likely constructed on top of the former Karlag camp center. The most remarkable buildings identified there were a warehouse (Fig. 3) and several barracks. Half of one well-preserved barracks is used as a house today (Fig. 4).

In fact, many gulag-era structures at these sites were modified to be reused for multiple purposes after Karlag ended. Some have even become dumping grounds. This raises concerns about the future preservation of these buildings. They are at a serious risk of further deterioration due to weathering and human activity.



Fig. 3. Remains of a two-story Karlag-era mudbrick factory identified by the CAG team.



Fig. 4. An example of a mudbrick barrack which was converted into a house after Karlag closed.

Thereby, the research team made a number of recommendations, including fencing off key structures, installing informative and commemorative signage for visitors, and establishing preservation guidelines for modifications to or destruction of known Karlag structures. It is also important to consider a citizen-led inventory of the houses and structures within the village to help identify additional possible Karlag-era structures. Local residents can play a key role in preservation of these buildings. For example, the south zone at Volkovskoe remains well-preserved thanks to the protection efforts of local farmer, Alexander Matvenyuk.

CONCLUSION

The CAG project is driven by goals that extend beyond academic research. A key aim is to increase awareness of Kazakhstan's role in the global history and development of penal systems. As part of this goal, the project strives to reach broader audiences, including foreigners outside Central Asia, by sharing knowledge about relevant historical sites.

To support this, a team of student researchers created a script for a documentary about the site of Volkovskoe. The main takeaway messages include the importance of remembering and preserving sites with dark heritage, how to manage the sites and historical periods characterized by controversy, censorship, and human rights abuse, and the need to educate future generations so that similar episodes are less likely to happen again.

By bringing together archaeological research, community involvement, and long-term conservation, the CAG project aims to deepen understanding of Gulag history in Kazakhstan. Thus, it offers new perspectives on the global history of punishment while encouraging a more thoughtful engagement with the country's penal past.

BEHIND THE RESEARCH: INTERVIEW WITH MILOVAN FUSTIC



ID Milovan Fustic, PhD



Kazakhstan is the world's largest uranium producer. How is your background in sedimentary and petroleum systems relevant to uranium exploration and mining?

Before joining academia, I worked in R&D teams at major international companies, including Equinor (formerly Statoil), where we focused on characterizing complex reservoirs and developing innovative solutions to turn technically challenging assets into commercially viable opportunities. Our work often delivered significant economic value and required rapid, practical problem solving.

This experience translates directly to uranium in Kazakhstan. The country's major uranium deposits occur in sedimentary formations similar to petroleum reservoirs, meaning that many exploration, drilling, and recovery techniques developed in the oil and gas industry can be effectively applied to uranium operations.

By transferring sedimentological expertise, reservoir characterization methods, and an innovation driven approach, we can better address geological complexity, improve operational efficiency, and unlock additional value in Kazakhstan's uranium sector.

Unlocking Value Beneath the Surface: Research Supporting Kazakhstan's Uranium Sector

Milovan Fustic, PhD is an Associate Professor at the School of Mining and Geosciences, Department of Geological Sciences, Nazarbayev University. He specializes in sedimentology, petroleum geology, and sedimentary hosted mineral deposits with research focused on improving geological understanding and supporting efficient resource development.

Dr. Fustic actively collaborates with industry and contributes to applied research that addresses real-world challenges in energy and mining. He supervises graduate research and is currently accepting PhD students interested in sedimentology, petroleum systems, and sedimentary hosted mineral deposits.

You have been working with KATCO (a joint venture between Kazatomprom and Orano) for several years. How did this partnership begin?

Shortly after arriving in Kazakhstan, I received an unexpected call from Dr. Gerard Fries, then General Director of KATCO, who had come across my work in sedimentology and invited me to lunch. What started as a collegial discussion quickly evolved into an invitation to visit the uranium operation, review data and cores, and explore how modern sedimentological approaches could improve reservoir understanding and recovery. While also supporting training for local students and technical teams.

I accepted the challenge and soon found myself on site at one of the world's largest in situ leaching operations. Immersed in field observations, we identified several research opportunities and developed a joint proposal that was launched during the COVID lockdown, marking the beginning of a strong and productive collaboration.

Currently you are in the third phase of this industrial research partnership. How has your work impacted field operations? Is there any way to quantify the value of your contribution in production or savings?

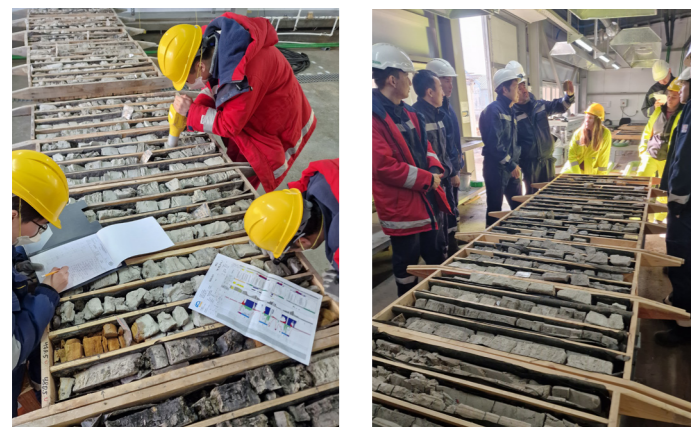
Yes. After the successful completion of **Phase 1**, which established the framework of deposits up to 80

meters thick formed over millions of years, **KATKO's** executive team launched a second multiyear research program focused on the geological controls of the technically challenging **South Tortkuduk field**.

We completed this phase with a comprehensive report of more than 1,000 pages and extensive graphical documentation. The project also included hands-on core description training, onsite computer modeling for employees, and a two-day field excursion to reservoir analogues in the **Syrdarya** and **Chu-Sarysu basins**. These activities strengthened **Katko's** technical capacity and improved understanding of sedimentological controls on in situ recovery performance.

Key outputs included geospatial **ISR** risk assessment charts, maps, and models that help predict development challenges, locate them in the subsurface, and assess their likely impact. We also developed a surface- and geobody-based reservoir geomodeling workflow to improve simulation studies and field development planning.

The value of this work can be seen in both short- and long-term results. A clear short-term example was presented by **Katko's engineers** at an **International Atomic Energy Agency** meeting: recognizing inclined heterolithic strata, one of eight geospatially identified risk factors, helped optimize ISR operations in part of the field and significantly reduce acid consumption. Across millions of tonnes of production over the field's life cycle, this represents substantial savings.



Beyond operational gains, the project has also changed how technical staff understand reservoirs. Instead of seeing them as random sand bodies, geologists now interpret them as parts of depositional systems such as rivers, shorelines, and deltas. This shift supports better decision-making, more innovative problem-solving, and long-term improvements in operational performance.

Part of your mission is to train young talent to fill the needs of Kazakhstan for highly qualified personnel. How has this project or series of project addressed this national need?

I think there is no doubt that it is directly aligned with that mission. A few days ago, I saw a statement by Mr

Sayasat Nurbek, the Minister of Education, who noted: "You can produce articles and patents, but if they do not create value for your industry and your economy, then you are missing the point." I can confidently say that every thesis and report produced during this project has a strong applied component that has either already been adopted by industry or is currently in the process of implementation.

The training opportunities provided to NU students and research assistants have been equally valuable. They worked on real world problems, communicated directly with operational and research and development staff from Katko JV LLP and Orano, and experienced firsthand how to identify and resolve practical challenges. In addition, they conducted fieldwork with me, applied knowledge from their coursework, and presented their results to funding organizations as well as at international conferences, all at no cost to NU. For several of these students, Katko has even created dedicated roles to build on the expertise they developed through the project.

What other developments are needed for improvements in the uranium mining industry?

The science never ends. Every new solution leads to new observations and scientific questions. At the end of Phase 2, we have together with Katko's leaders and researchers identified 7 new research topics – each of them aiming to further improve the exploration and production. Because of NDA I cannot share specifics.

You have other research interests besides uranium with huge potential impact for Kazakhstan. Can you mention some and their importance?

Yes. Much of my research at Nazarbayev **University** focuses on applied solutions aligned with Kazakhstan's national priorities, especially **decarbonization**. This includes geological pathways for **carbon storage**, such as mineral carbonation in ultramafic and glauconite-bearing sands, as well as carbon adsorption in coals and organic-rich formations.

This work gained strong momentum with the arrival of Dr Mahmoud Leila, whose experimental and geochemical expertise has been instrumental. Together with Dr Randy Hazlett and Dr George Mathews, we are advancing these ideas in close collaboration with industry partners, moving from successful laboratory results toward potential field-scale pilots.

Beyond carbon storage, we have demonstrated the carbon adsorption potential of Karaganda coal, developed new geothermal play concepts, and identified promising geothermal fairways. Industry interest continues to grow, with companies such as Pallas Resources, Ivanhoe Mines, Eurasian Resources Group, QazaqGaz, KazGerMunai, and North Caspian Operating Company seeking collaboration.

These efforts highlight the wider potential of Kazakhstan's sedimentary basins for innovation in energy, decarbonization, and mineral development.

It seems that working with industry has multiple benefits comparing with strictly academic projects.

Both academic and industry research are important. Personally, I am drawn to applied research because I enjoy solving real-world problems and creating impact beyond citations. However, industry collaboration can be

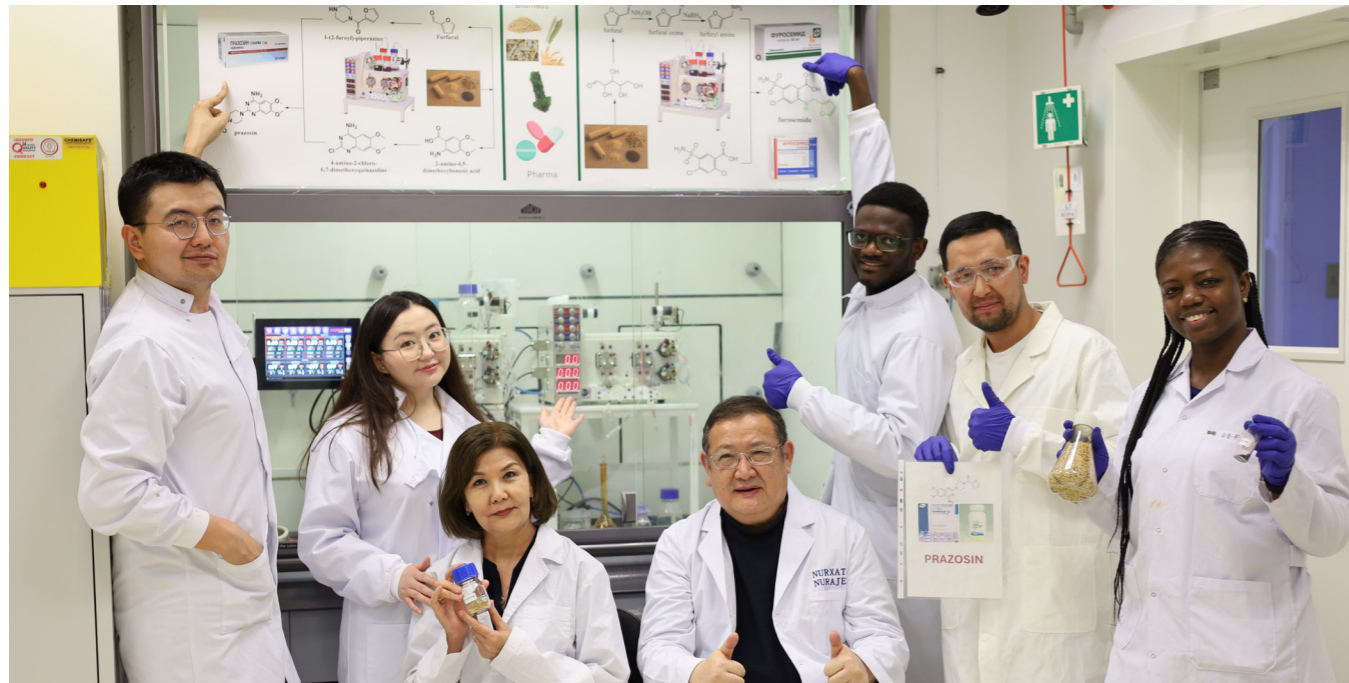


slower and more demanding. Proposal development may take years, project priorities can shift, reviews are rigorous, and publication approval is often a long process. As a result, many valuable ideas and results do not always receive the same academic recognition.

At the same time, applied research can generate significant practical and economic value that is not always reflected in academic metrics such as Q1 papers, citations, or h-index. These are different forms of impact, and for me, applied research is especially meaningful. It is also closely aligned with the priorities of Nazarbayev University.



FROM BIOMASS TO PHARMA: NU RESEARCHERS DEVELOP NOVEL CONTINUOUS FLOW TECHNOLOGY FOR SUSTAINABLE API PRODUCTION



Professor Nuraje and the Biomass Group standing with the continuous flow reactor used for the synthesis of Prazosin and Furosemide.

The biomass group at the Renewable Energy Laboratory, led by Nurxat Nuraje, is advancing sustainable methods for producing valuable chemicals and active pharmaceutical ingredients (APIs) from renewable biological resources. By transforming biomass and agricultural waste into versatile platform molecules, the team employs innovative techniques such as photo-, mechano-, and flow chemistry to develop efficient and environmentally friendly synthesis routes. Notably, the group has already successfully synthesized APIs including Prazosin and Furosemide from biomass-derived feedstocks. Their work highlights the potential of green chemistry to reduce dependence on fossil resources and supports the development of a more sustainable and circular pharmaceutical industry.

HOW BIOMASS BECOMES MEDICINE

Led by **Professor Nurxat Nuraje**, the [Biomass Group at the Renewable Energy Laboratory](#) is pioneering the transition toward sustainable pharmaceutical synthesis through innovative **continuous flow chemistry**. This research, primarily funded by the Nazarbayev University Collaborative Research Programme (NU CRP, 2023–2025) and the MES RK project (2022–2024), was successfully executed under Professor Nuraje's leadership as the PI for both initiatives.

The project thrived on international synergy, collaborating with **Professor Tulegen** (Kokshetau University, Kazakhstan) and **Professors Alina Balu and Rafael**

Luque (University of Cordoba, Spain). By transforming agricultural waste into platform molecules, the team has developed a pathway to produce high-value **Active Pharmaceutical Ingredients (APIs)**. Notably, they have successfully synthesized **prazosin** and **furosemide**, essential treatments for hypertension and edema, directly from biomass feedstocks. With one utility model secured, a Eurasian patent and an invention patent pending, and several publications in high-impact journals, this work underscores the power of **green chemistry**. By reducing reliance on fossil fuels and utilizing continuous flow technology, the team is positioning Kazakhstan at the forefront of industrial pharmaceutical innovation.

THE CORE RESEARCH TEAM:

Dr. Minavar Shaimardan (Group Leader)
Serik Zhumagazy (Senior Researcher)
Harry K. Megbenu & Makpal Rakhatkyz
Zhanat Azhikhanova & Kyran Kassym
Gertrude Ellen Fynn (NU PhD student)



Photo 2. Schematic illustration of the synthesis of Prazosin and Furosemide from biomass-derived feedstocks

BUILDING ROADS THAT LAST: RESEARCH FOR A MORE SUSTAINABLE KAZAKHSTAN



In Kazakhstan, roads must endure far more than traffic. They must survive freezing winters, dry summers, saline soils, expansive clays, and sharp seasonal shifts that place constant pressure on infrastructure. For Professor Sung-Woo Moon, this is where research becomes deeply human: behind every stronger road is a question of safety, resilience, and long-term public value. His work is driven by the belief that engineering should not only solve today's problems, but also build a more sustainable future.



SCHOOL OF
ENGINEERING AND
DIGITAL SCIENCES

ID Professor Sung-Woo Moon, PhD, is an Associate Professor

At the School of Engineering and Digital Sciences, Department of Civil and Environmental Engineering, and the Principal Investigator of the Geotechnical and Geophysical Engineering Research Group (GGERG). His academic and research interests include seismic hazard assessment, soil stabilization and improvement, and geophysical site characterization. He is currently accepting PhD students, with available supervision in projects related to these areas.

RESEARCH QUESTION

At the center of Professor Moon's work is a practical and urgent question: how can Kazakhstan build roads that are both more durable and less carbon-intensive? His research focuses on the geotechnical challenges that make road construction in Kazakhstan especially demanding, including problematic soils, harsh climate conditions, and the need for better performance over time. Rather than treating these as isolated issues, he approaches them as part of one larger challenge: creating road infrastructure that performs reliably under real local conditions while reducing environmental impact.

HOW ARE LABORATORY METHODS HELPING IMPROVE ROAD ENGINEERING IN KAZAKHSTAN?

Since joining Nazarbayev University in 2017, Professor Moon has been developing applied geotechnical research that connects laboratory science with engineering practice. His work currently follows three major directions. The first is low-carbon soil stabilization using industrial by-products and alternative binders such as Basic Oxygen Furnace (BOF)

slag, phosphogypsum, and Calcium Sulfoaluminate (CSA) cement. These materials offer the possibility of reducing the use of conventional cement while improving the strength of road subgrades.

The second direction focuses on saline and expansive soils, which are common in Kazakhstan and can seriously reduce road durability. Professor Moon's team studies how these soils behave under repeated freeze-thaw and wet-dry cycles, with the goal of improving their mechanical performance and long-term stability. The third direction involves non-destructive testing and smart monitoring. Using seismic tools such as DataCube units and methods including MASW and HVSR, the team is developing rapid on-site quality control approaches that do not damage pavement structures.

This work is supported by advanced geotechnical and geophysical laboratory facilities at Nazarbayev University. These allow researchers to simulate severe winter conditions and generate the kind of evidence needed before new materials or methods can be used more widely in the field. In this way, the laboratory becomes not just a research space, but a bridge to practical implementation.

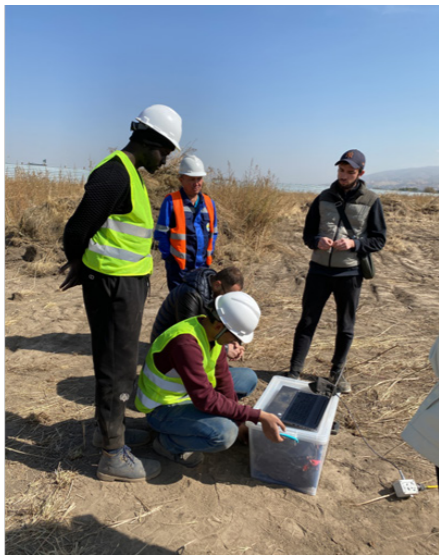
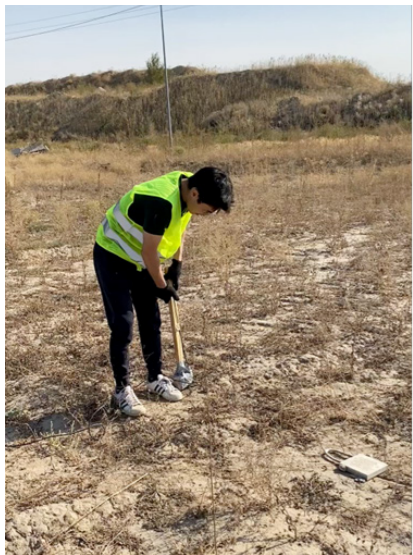
CHALLENGES

One of the biggest challenges Professor Moon identifies is that road infrastructure in Kazakhstan must perform under very demanding environmental conditions. Temperature extremes, problematic soils, and long-term durability issues all make road engineering more complex. At the same time, introducing innovative materials into practice is not always easy. Industry needs reliable evidence before adopting new approaches, and construction systems often depend on conservative standards that can slow change.

This is why validation matters so much in his research. New solutions must not only look promising in theory; they must also prove themselves under realistic conditions. Whether the topic is low-carbon stabilization or non-destructive testing, the challenge is always the same: turning scientific potential into engineering confidence.

WHY DID KAZAKHSTAN BECOME THE RIGHT PLACE FOR PROFESSOR MOON'S RESEARCH?

Professor Moon's journey into this work has been shaped by both international expertise and practical engineering experience. Before coming to Kazakhstan, he worked in the United States and Singapore and also gained industry experience in South Korea through road design and construction projects. What drew him to Kazakhstan was not only the scale of its development, but the uniqueness of its geotechnical environment. He describes the country as a "living laboratory" for road research.



That perspective also shapes how he works with students and younger researchers. Together with his student, he received second place in a Young Researchers Competition for a project on low-carbon soil stabilization using BOF slag. The project showed how an industrial by-product that poses environmental challenges can be transformed into a useful construction resource that reduces cement use and improves freeze-thaw resistance. For Professor Moon, this was more than an award. It was proof that research can create solutions with both scientific and social value.

WHAT COMES NEXT

Looking ahead, Professor Moon sees strong potential for applying this research in real road projects in Kazakhstan. His next steps place even greater emphasis on long-term durability, especially under extreme climatic conditions, as well as on life cycle assessment (LCA) of road materials and low-carbon engineering solutions. He also sees continued collaboration between academia,

industry, and specialized research institutions as essential for moving from experimentation to implementation.

Ultimately, his work is about more than materials or testing methods. It is about building roads that last longer, perform better, and place less burden on the environment. In a country where infrastructure must meet both geographic and climatic extremes, this research is helping define what smarter and more sustainable road engineering can look like.


"Science and innovation are the key to durable and sustainable roads."



RESEARCH SNAPSHOT

Brief insights into recent studies, publications and discoveries from the NU research community.



 Alfredo Satyanaga
Associate professor, School of Engineering and Digital Sciences



SCHOOL OF
ENGINEERING AND
DIGITAL SCIENCES

These recent publications highlight Professor Alfredo Satyanaga's research in unsaturated soils and slope stability with multiple papers published in Q1 journals (including publications in the top decile or top 10%) indexed in Scopus and Web of Science.

KEY RESEARCH DIRECTIONS

The research works advance the understanding of soil-water interaction in unsaturated soils, with a strong focus on its implications for slope stability and real-time risk assessment. The study integrates:

- characterization and prediction of soil suction–stiffness relationships,
- improved interpretation of the soil-water characteristic curve (SWCC) considering evolving soil structure, and
- development of IoT-based sensing systems for continuous, real-time monitoring and factor of safety evaluation.

Together, these studies establish a unified framework that links fundamental hydro-mechanical behav-

ior with data-driven monitoring, enabling more reliable and proactive slope stability assessment under changing environmental conditions.

1. Predictive models of the initial shear modulus of unsaturated sandy and silty soils from soil index properties - Bulletin of Engineering Geology and the Environment (2026).

[Read More](#)

WHY PREDICTING SOIL STIFFNESS MATTERS

The initial shear modulus is an important parameter for understanding how soil deforms under stress. In unsaturated soils, this value changes with soil suction, which makes prediction difficult but essential for reliable geotechnical analysis.

HOW THE MODEL WAS DEVELOPED

The researchers compiled published data on sandy and silty soils, including soil index properties, soil-water characteristic curves, and measured initial shear modulus values. Using regression analysis and statistical testing, they developed and verified prediction models based on soil index properties.

WHAT THE FRAMEWORK REVEALS ABOUT SLOPE CONDITIONS

The study showed that the initial shear modulus of unsaturated soils can be estimated directly from soil index properties. This provides a more practical and transferable alternative to models that depend heavily on experimental curve-fitting.

2. Estimation of soil suction from field measured water content – Bulletin of Engineering Geology and the Environment (2026). [Read More](#)

WHY SOIL SUCTION IS DIFFICULT TO CAPTURE IN THE FIELD

Soil suction plays a critical role in slope stability, especially during rainfall. However, direct field measurement is often difficult, time-consuming, and limited by equipment constraints.

HOW WATER CONTENT WAS USED TO ESTIMATE SUCTION

The study proposed a framework for estimating soil suction from field-measured water content by calibrating laboratory drying and wetting soil-water characteristic curves. The method was tested using residual soil from a monitored slope in Singapore with moisture sensors, rain gauges, and piezometers.

WHAT DID THE RESEARCHERS FIND?

The results showed strong agreement between measured and estimated values for both drying and wetting conditions. The study also found that soil suction responses vary with depth, while moisture accumulation near the slope toe may increase landslide risk.

3. Estimation of the initial shear modulus of unsaturated soil from soil-water characteristic curve - Engineering Geology (2026). [Read More](#)

WHY UNDERSTANDING STIFFNESS IN UNSATURATED SOILS MATTERS

The initial shear modulus is closely linked to soil collapse, small-strain deformation, and slope response. In unsaturated soils, predicting this parameter remains a major challenge because stiffness changes with saturation and suction.

HOW THE RESEARCHERS LINKED STIFFNESS TO SOIL-WATER BEHAVIOR

The authors developed a new spring-based method that treats unsaturated soil as a system of randomly distributed wet and dry fractions. The model was validated against 45 sets of experimental data collected from 13 published studies.

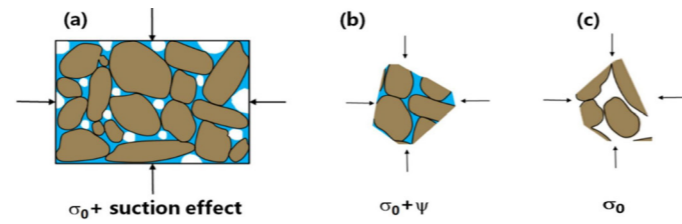


Fig. 1. Illustration of both wet fractions and dry fractions in the unsaturated soil element. (a) Unsaturated soil element; (b) Wet fraction; (c) Dry fraction.

WHAT THE NEW METHOD CONTRIBUTES

The proposed method showed good agreement with measured data across different soils and testing conditions. The study suggests that a physically informed statistical approach can improve estimation of soil stiffness under unsaturated conditions.

4. Instrumented unsaturated slope monitoring with IoT-based factor of safety calculations - Journal of Rock Mechanics and Geotechnical Engineering (2026). [Read More](#)

WHY REAL-TIME SLOPE MONITORING IN UNSATURATED SOILS MATTERS

Slope failures in unsaturated soils are often triggered by transient environmental conditions such as rainfall infiltration, which alters suction and reduces shear strength. Traditional monitoring approaches rely on periodic measurements and simplified assumptions, making it difficult to capture the dynamic evolution of stability. A real-time, data-driven approach is essential to improve early warning systems and better understand the mechanisms governing unsaturated slope behavior.

HOW THE RESEARCHERS INTEGRATED IOT WITH GEOTECHNICAL ANALYSIS

The study presents an instrumented slope system equipped with IoT-based sensors to continuously measure key hydrological and geotechnical parameters, including soil suction, moisture content, and pore-water pressure. These data are transmitted in real time and coupled with analytical formulations to compute the factor of safety (FoS) under changing field conditions. The framework enables continuous updating of stability conditions rather than relying on static or infrequent assessments.

WHAT THE MONITORING FRAMEWORK REVEALS

The results demonstrate that the IoT-based system successfully captures the temporal variation of slope stability, particularly during rainfall events. The computed FoS shows clear sensitivity to changes in suction and moisture, highlighting the importance of unsaturated soil mechanics in slope performance. The system also provides valuable insights into the lag between infiltration and stability reduction, which is critical for early warning.

WHAT THE NEW APPROACH CONTRIBUTES

This study introduces a practical and scalable framework that combines real-time sensing with stability analysis for unsaturated slopes. By integrating IoT technology with geotechnical modeling, the approach enhances the reliability of slope monitoring and enables proactive risk management. The work highlights the potential of digital and data-driven methods to transform slope stability assessment from a reactive to a predictive practice.

5. Evaluation of the shear modulus of unsaturated soils estimated from different indirect methods - Environmental Geotechnics (2026). [Read More](#)

WHY MODEL SELECTION MATTERS IN GEOTECHNICAL ANALYSIS

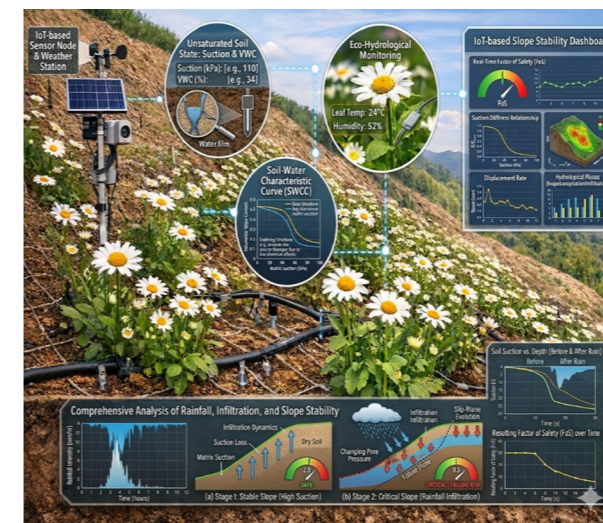
Many models have been proposed to estimate the shear modulus of unsaturated soils, but their reliability varies depending on soil type. Engineers need to know which methods are most suitable for practical geotechnical analysis.

HOW THE ESTIMATION METHODS WERE COMPARED

The researchers compared five mathematical models against 41 sets of published experimental data. Their performance was evaluated using several statistical tools, including scatter plots, Taylor diagrams, box plots, RMSE, and corrected Akaike Information Criterion.

WHAT THE EVALUATION SHOWS FOR DIFFERENT SOIL TYPES

The study found that all five models performed reasonably well for cohesive soils, but their accuracy varied for cohesionless soils. Based on the results, the authors recommended the most suitable models for each soil category.



6. Rainfall duration effect on slope stability of unsaturated silty sand soil – Frontiers in Built Environment (2026). [Read More](#)

WHY RAINFALL PATTERN MATTERS FOR SLOPE SAFETY

Rainfall-induced slope instability is a serious hazard in many regions, especially where unsaturated soils dominate near the ground surface. Understanding how rainfall duration affects infiltration and slope safety is essential for landslide risk assessment.

HOW THE SLOPE RESPONSE WAS SIMULATED

The study used advanced laboratory testing and numerical simulation to assess seepage and slope stability under three rainfall durations within one day: 6, 12, and 24 hours. The model incorporated unsaturated soil properties such as the soil-water characteristic curve, permeability, and shear strength.

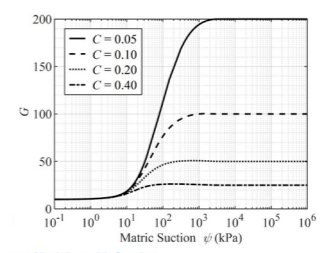
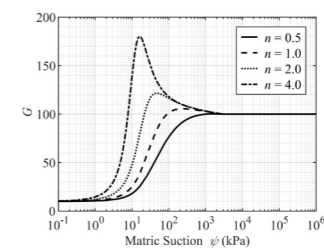
WHAT THE FINDINGS MEAN FOR LANDSLIDE RISK

The results showed that short, high-intensity rainfall caused the strongest reduction in the factor of safety. The study highlights that rainfall pattern, not only total rainfall, is crucial in understanding and mitigating slope instability.

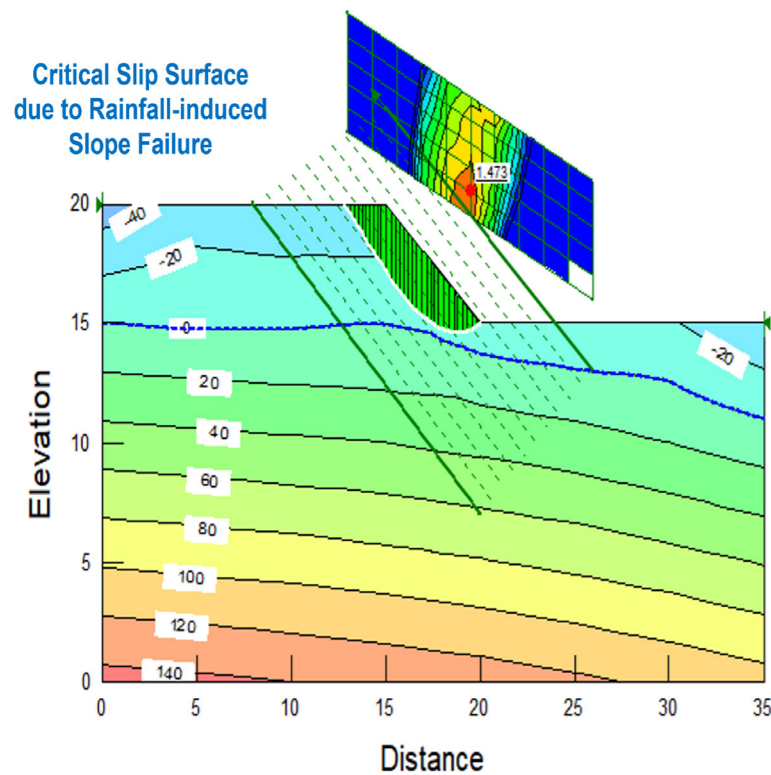
7. Effect of soil volume changes on the volumetric water content and saturation degree of the Soil-Water Characteristic Curve - Results in Engineering (2026) [Read More](#)

WHY ACCOUNTING FOR SOIL VOLUME CHANGE MATTERS

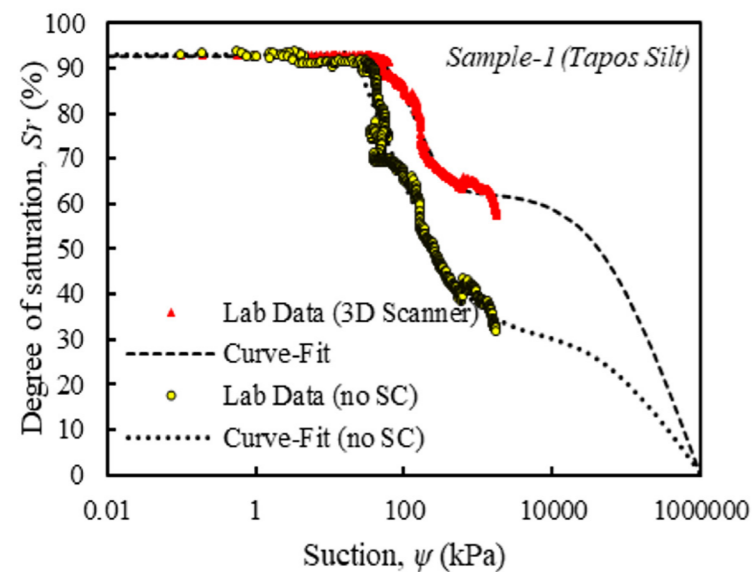
The Soil-Water Characteristic Curve (SWCC) is fundamental in unsaturated soil mechanics, linking suction with water content and degree of saturation. However, most conventional interpretations assume



constant soil volume, which can lead to significant inaccuracies. In reality, unsaturated soils undergo shrinkage and swelling during drying and wetting, altering void ratio and pore structure. Ignoring these volume changes can misrepresent volumetric water content and saturation degree, ultimately affecting predictions of hydraulic and mechanical behavior.



3-D Scan for Soil Volume Measurement



The Effect of Soil Volume Change on Soil-water Characteristic Curve

WHAT THE RESULTS REVEAL ABOUT SWCC BEHAVIOR

The findings show that soil volume reduction during drying significantly alters the shape and interpretation of the SWCC. When volume change is considered, the relationships between suction, volumetric water content, and degree of saturation become more physically meaningful and consistent. In contrast, neglecting volume change can lead to underestimation or misinterpretation of water retention characteristics, especially in soils prone to shrink-swell behavior.

WHAT THE NEW CONTRIBUTION OFFERS

This work highlights the necessity of integrating shrinkage characteristics into SWCC analysis and provides a more rigorous framework for interpreting unsaturated soil behavior. The study demonstrates that coupling SWCC with volume change relationships improves the accuracy of key parameters used in geotechnical and environmental applications. This contribution is particularly valuable for advanced modeling of unsaturated soils, where reliable prediction of hydraulic and mechanical responses depends on consistent representation of soil structure evolution.

HOW THE RESEARCHERS ADDRESSED THE LIMITATION IN SWCC INTERPRETATION

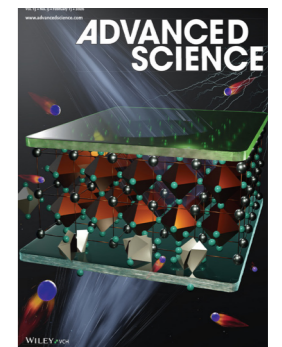
This study systematically investigates how soil volume changes influence the representation of SWCC in terms of volumetric water content and degree of saturation. By incorporating the shrinkage behavior of soils into the analysis, the researchers establish a more consistent framework linking water content, void ratio, and saturation. The approach recognizes that volumetric water content is not solely governed by suction but is also directly affected by evolving soil structure (e.g., changes in porosity and bulk density).

RADIATION-TOLERANT BIFACIAL PEROVSKITE PHOTODETECTORS FOR HARSH ENVIRONMENTS



Askhat Jumabekov, PhD Associate Professor, Department of Physics, School of Sciences and Humanities, Nazarbayev University

“The combination of bifaciality and radiation tolerance enables stable photodetector operation even under extreme irradiation conditions, paving the way for next-generation radiation-resistant optoelectronics.”



WHY IS THIS RESEARCH IMPORTANT?

A new route toward optoelectronics for extreme environments

A recent study published in Advanced Science reports on high-performance bifacial perovskite photodetectors (BPPDs) and their behavior under extreme ionizing radiation. The work demonstrates that the devices retain over 60% of their initial performance after high-energy xenon ion irradiation, confirming their strong potential for optoelectronic applications in radiation-exposed environments. The study was featured on the cover of the journal, highlighting its scientific significance.

Meeting the challenge of radiation-resistant device design

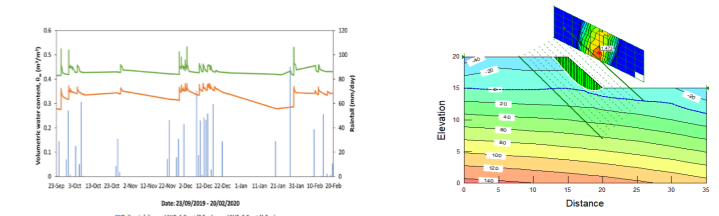
The development of radiation-resistant optoelectronic devices is essential for applications in space technologies, nuclear environments, and high-energy physics systems. Perovskite-based devices are known for their outstanding optoelectronic properties, yet their stability under ionizing radiation remains a critical challenge.

HOW DID THE RESEARCHERS TEST RESILIENCE UNDER RADIATION?

Simulating harsh radiation exposure

In this work, the authors present a systematic study of BPPDs exposed to high-energy xenon ion irradiation (231 MeV) with fluences up to 1011 nucleons-cm⁻², simulating extreme radiation conditions. A comprehensive analysis was performed, including detailed characterization of the functional layers and device-level performance before and after irradiation.

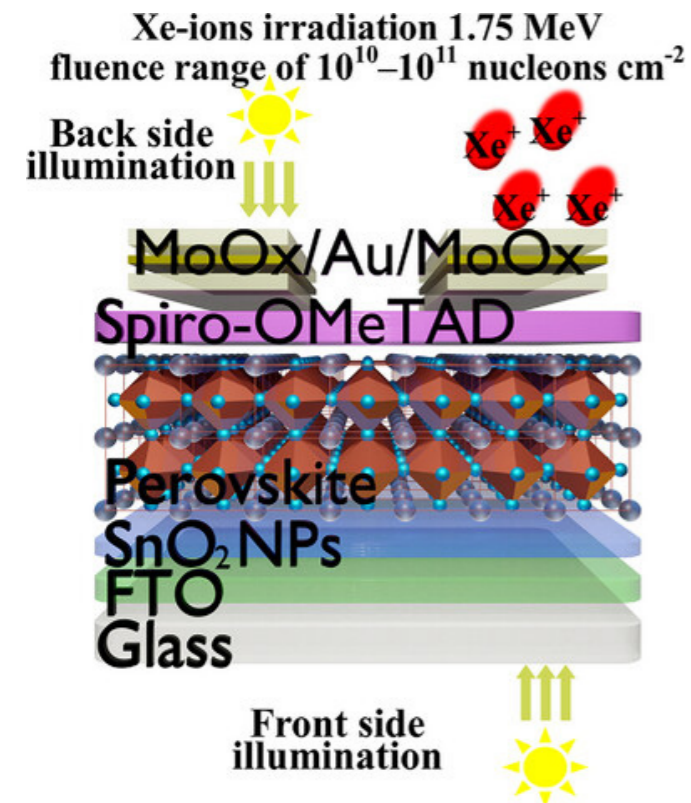
Prior to irradiation, the devices demonstrated strong performance, with responsivity reaching 0.39 A-W⁻¹ (front side) and 0.33 A-W⁻¹ (back side), and detectivity up to 2.4 × 10¹¹ Jones. At moderate irradiation levels (1010 nucleons-cm⁻²), only slight changes in responsivity were observed, while detectivity increased due to enhanced shunt resistance – indicating a complex interplay between defect formation and charge transport. At higher fluence (1011 nucleons-cm⁻²), radiation-induced defects led to a noticeable degradation in performance. Nevertheless, the devices retained more than 60% of their initial responsivity and maintained low spectral noise density, demonstrating remarkable resilience.



WHAT THE FINDINGS MEAN FOR THE FIELD

The study highlights the synergistic effect of bifacial architecture and intrinsic material stability, enabling reliable operation under harsh radiation exposure. These findings provide new insights into radiation-induced processes in perovskite devices and establish a pathway toward radiation-hardened optoelectronics.

a) Schematic illustration of the BPPD device structure and b) corresponding energy levels diagram. SRIM simulations of 231 MeV xenon ion interactions with the device structure: c) full penetration depth and d) magnified view of the device functional layers.



KEY FINDINGS

- BPPDs show high tolerance to high-energy xenon ion irradiation
- Devices retain >60% of initial performance even at high fluence
- Detectivity initially increases due to radiation-induced shunt resistance effects
- High fluence leads to defect formation but does not cause catastrophic failure
- Low spectral noise density is preserved after irradiation

WHY IT MATTERS

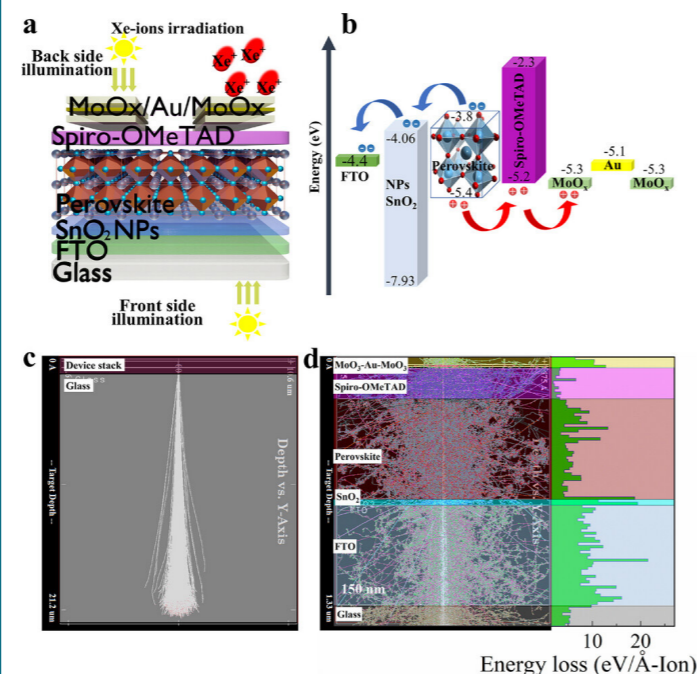
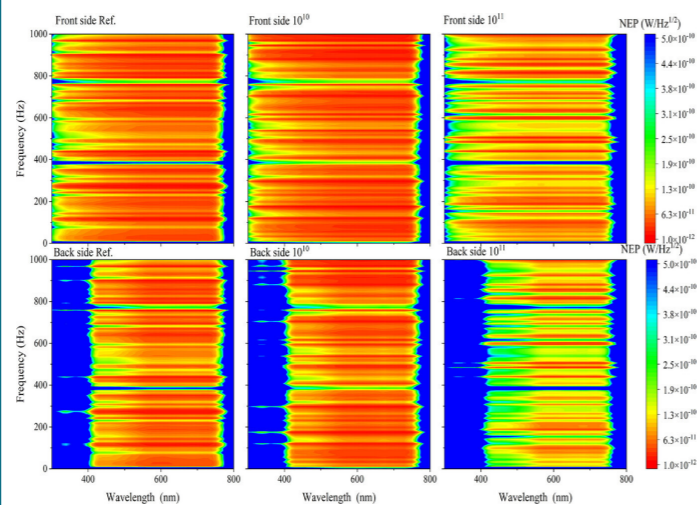
This work demonstrates that perovskite photodetectors, traditionally considered sensitive to radiation, can operate reliably under extreme conditions. The combination of bifacial device design and radiation tolerance opens new opportunities for lightweight, high-performance photodetectors in space missions, satellite systems, and nuclear technologies.

WHAT WAS DONE

- Fabrication and testing of BPPDs
- Irradiation using high-energy xenon ions (231 MeV)
- Fluence range: 10¹⁰-10¹¹ nucleons-cm⁻²
- Comprehensive characterization: responsivity, detectivity, noise, and material properties
- Analysis of radiation-induced degradation mechanisms

NEP of the BPPDs for front- a-c) and back-side d-f) illumination: (a, d) before irradiation, (b, e) after irradiation at a fluence of 10¹⁰ nucleons cm⁻², and (c, f) after irradiation at 10¹¹ nucleons cm⁻².

Link (DOI / URL):
 DOI: <https://doi.org/10.1002/advs.202516418>
 DOI: <https://doi.org/10.1002/advs.73893>



FROM CHAOS TO ORDER: A TOP 2% JOURNAL STUDY ON SATELLITE ORIENTATION STABILITY

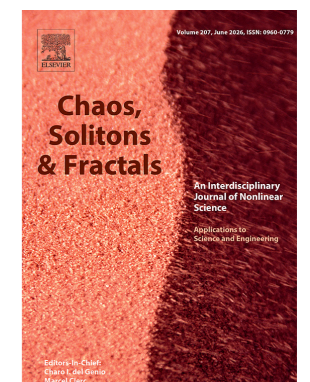


ID Dr Dmitry Sizov, Principal Investigator and Instructor in the Department of Mechanical and Aerospace Engineering, School of Engineering and Digital Sciences



SCHOOL OF SCIENCES AND HUMANITIES

“Chaos is not just abstract mathematics; it is something engineers face in real satellites. Between chaos and order, there is a well-defined boundary, and we show how to find it and how to push it to reduce chaos.”



Chaos, Solitons & Fractals (Scopus Top 3% in Mathematical Physics; CiteScore 9.9, Impact Factor 5.6)

A new study “Chaos in pitch dynamics of monostable, bistable, and tristable satellites with damper in elliptical polar LEO/VLEO” by Dr Dmitry Sizov, Principal Investigator and Instructor from SEDS, and Prof Vladimir Aslanov (Russia), published January 2026 in Chaos, Solitons & Fractals, a Top 2% Scopus-ranked journal, explains why satellites can suddenly start tumbling unpredictably in orbit and shows how this can be prevented using simple, low-cost control solutions.

“In orbit, regularity and predictability are not something you can take for granted; they have to be carefully designed into the system from the very beginning, because even small disturbances can eventually lead to chaos.”

SATELLITE ATTITUDE STABILITY MATTERS

Many artificial Earth satellites, especially small, inexpensive ones called CubeSats (tiny satellites roughly the size of a shoebox), operate in low Earth orbit, which means they fly relatively close to Earth, typically a few hundred kilometers above the surface. At these altitudes, satellites are still affected by the thin atmosphere, Earth’s gravity, and even its magnetic field. These factors influence how a satellite rotates, which engineers call its attitude (its orientation in space). A stable position is an orientation where a satellite naturally “settles” in space. If it is slightly disturbed, the forces acting on it gently bring it back to that same position. Some satellites have only one stable orientation (monostable), while others

HIGHLIGHTS

- Attitude motion of magnetic satellite in elliptical polar LEO/VLEO is considered.
- Chaos in pitch dynamics of monostable/bistable/tristable satellites is investigated.
- System parameters suppressing chaos are indicated.

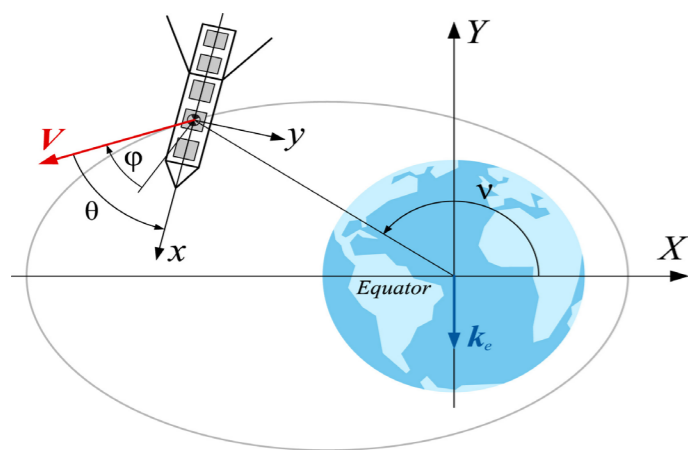


Figure 1. An arrow-shaped monostable satellite in an elliptical orbit

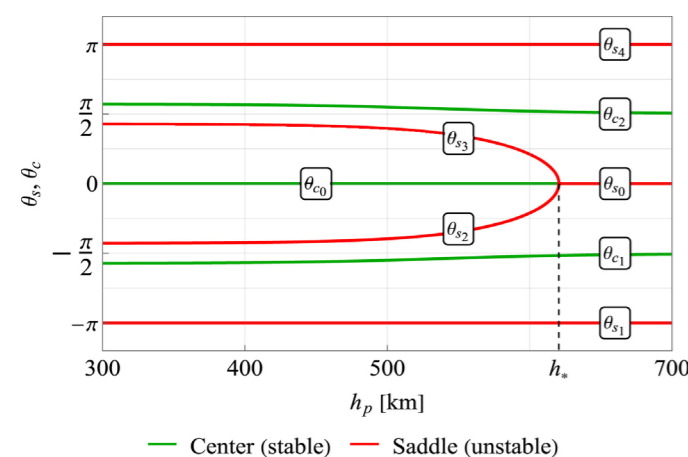


Figure 2. Transition between satellite tristability and bistability

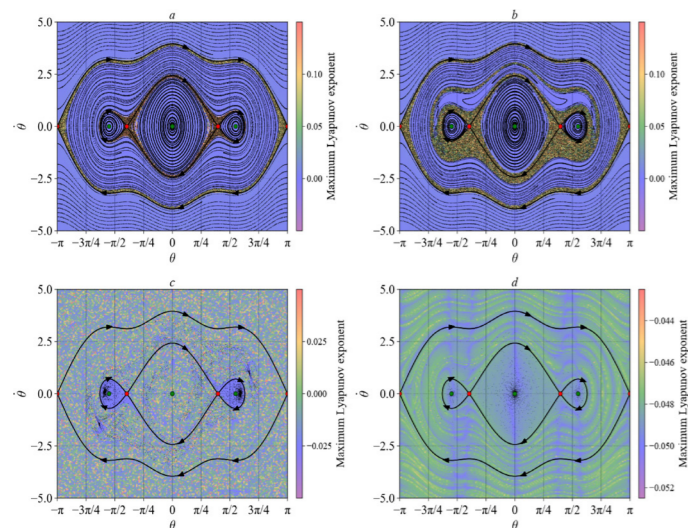


Figure 3. Regular (blue) and chaotic (yellow) zones for a tristable satellite in a 500 km altitude orbit

can settle into two or three different stable positions (bistable or tristable). For example, an arrow-shaped satellite (Figure 1) is monostable, as it has one preferred orientation when it flies in the rarefied air. But a satellite looking like a flying saucer can be tristable, meaning it can settle in several different orientations. Satellites can switch

between stability types depending on their orbital altitude. For example, the evolution of the green curves in Figure 2 demonstrates a transition from the tristable mode to a bistable one if we increase the altitude. Engineers use these stable positions to keep satellites oriented correctly or rotating in a predictable way. This matters because predictable rotation ensures communication with Earth-based control centers and power generation by solar panels.

CHAOS

NU researchers showed that under certain conditions, the attitude motion of satellites in low Earth orbit can become chaotic, that is, extremely sensitive and seemingly random. Chaotic motion is similar to weather: small differences grow over time, making long-term behavior hard to predict. For a satellite in a chaotic regime, even tiny changes in motion parameters can lead to completely different behavior, making the satellite difficult to control. In practice, this means that two almost identical satellites can end up rotating in completely different ways after some time. This behavior is visualized in Figure 3. Each point represents a possible initial state of the satellite (angle and angular rate). The color shows how sensitive the motion is to small disturbances: blue regions correspond to regular, predictable motion, while yellow regions indicate chaotic motion, where small differences grow rapidly.

Chaos is a very complex phenomenon in the theory of dynamical systems, and its detection and analysis require special tools. Using a combination of analytical (the Melnikov method) and numerical methods (Poincaré sections and Lyapunov exponents), the study identifies clear boundaries between regular and chaotic motion regimes for typical aerodynamically stabilized CubeSats. The key parameters here are orbital eccentricity, the mass and shape of the satellite, and its magnetic properties.

FROM CHAOS TO ORDER

The key practical result of the study is that chaotic satellite motion can be avoided using passive stabilization, that is, simple design features that do not require computers or active control systems. A small internal damper, similar to a shock absorber, can absorb unwanted motion and suppress chaos, making the satellite behave in a regular and predictable way. In practice, this means more reliable satellites with simpler designs.

[Read the full article](#)

TOWARD MORE SUSTAINABLE PLAGIARISM POLICIES IN AN AI HIGHER EDUCATION ENVIRONMENT: A STUDENT-INFORMED CASE STUDY



ID Alejandro Acuyo Cespedes, Head of Discipline, EAP CPS, NU, PhD, Lancaster University, SFHEA



ID Elmira Tursunkhanova, Head of Discipline, Leadership, CPS, NU, Doctoral student (DBA), FBA, Prague University of Economics and Business, VSE, SFHEA



Journal cover picture
Journal of Academic Ethics (2026) 24:44
<https://doi.org/10.1007/s10805-025-09718-9>



ABSTRACT

As the implications of artificial intelligence on plagiarism become more salient across universities, this study investigates students' views on artificial intelligence-assisted plagiarism as a concept, their satisfaction with the existing policy and their perspectives on future policy direction. Drawing on qualitative focus group data, the study reveals that students view artificial intelligence tools, such as ChatGPT, for instance, as both enablers of plagiarism and legitimate aids to learning. They criticize existing plagiarism policies as unclear and inconsistently applied, and call for a shift from punitive responses toward proactive training and assessment reform. The findings suggest that integrating artificial intelligence literacy into curricula and reducing reliance on high-stakes summative assessment can foster more sustainable academic integrity practices. The conclusions highlight the importance of including student perspectives in shaping plagiarism policies suited to an artificial intelligence-driven higher education landscape. Keywords Plagiarism · AI in education · Higher education · Technology enhanced learning

THE CHALLENGE. WHY IS THIS IMPORTANT?

As AI tools like ChatGPT become a part of everyday student life, universities face a growing tension between the new technical reality and existing plagiarism policies. Foundation Year students, just beginning their academic journey, offer particularly valuable perspectives on academic integrity. This study amplifies student voices, a stakeholder group that is directly affected by plagiarism policies yet rarely consulted in shaping them. While policy is often made top-down by management and teachers, the findings demonstrate that students hold nuanced, well-considered views on AI and plagiarism that can meaningfully inform institutional decision-making. Listening to Foundation Year students matters because their early experiences with academic integrity set the tone for their [entire university career](#).



Conceptualisation

1. AI lowers barriers to plagiarism
2. AI as a dual-use tool: plagiarism vs learning
3. AI's unreliability as a deterrent to plagiarism

Plagiarism in the AI Landscape

Current Policy

1. Ambiguity and misinterpretation of policies
2. Inconsistent enforcement of policies

Future Policy

1. Redesign assessments to reflect AI's ambiguity
2. Educate students on ethical use of AI
3. Shift focus from grades to learning

WHAT INSPIRED US?

We were inspired by the desire to help our students use AI ethically and responsibly from the very start of their higher education experience. As Foundation Year faculty, we recognize that how students learn to engage with AI tools at this early stage will shape their academic habits and integrity for their future undergraduate studies at Nazarbayev University and beyond. We are eager to give them strong foundational skills and not simply by banning AI, but by understanding their perspectives and working toward policies that equip them with the knowledge and awareness to use these tools as a support for learning, rather than as a shortcut around it.

FUTURE IMPLICATIONS

The study suggests 3 practical directions for universities:

- Proactive AI integration: treat AI tools as part of the curriculum, teaching students how to use them ethically and assessing this through activities like quizzes or rubric criteria.
- Assessment redesign: shift away from heavily weighted final assignments toward more frequent, lower-stakes tasks such as portfolios or short viva-style discussions.
- Holistic assessment: combine grades with qualitative feedback from teachers and peers to better support student development.

Future research should explore how AI affects specific aspects of plagiarism, include quantitative data from larger samples, and expand across institutions to improve generalisability.

KEY FINDINGS

23 Foundation Year students at Nazarbayev University participated in 5 focus groups. All were students aged 18, studying EAP, Leadership and Mathematics in an EMI context. The study found that:

- Students view AI tools like ChatGPT as both enabling plagiarism and supporting learning, rejecting a simplistic "good vs bad" dichotomy.
- AI increases opportunities for plagiarism due to its ease of access across platforms and devices.
- Plagiarism policies are seen as unclear or inconsistently enforced, with most students reporting uneven penalties.
- Students advocate for a shift from punishment to proactive approaches, including ethical AI training, redesigned assessments, and greater emphasis on learning over grades.

LATTICE STRUCTURES: THE FUTURE OF LIGHTER, STRONGER, SMARTER AEROSPACE AND BIOMEDICAL DESIGNS



ID Didier Talamona, Associate Professor, School of Engineering and Digital Sciences



SCHOOL OF ENGINEERING AND DIGITAL SCIENCES

Imagine a material that is mostly empty space, but still incredibly strong. Scientists and engineers are now designing such materials using advanced 3D printing, and they could transform industries from aerospace to medicine. A recent study, from NU's Additive Manufacturing lab, explores how the topology of these lightweight structures affects their strength and ability to absorb energy.

WHAT ARE LATTICE STRUCTURES?

Lattice structures are materials made of repeating patterns of tiny cells, like a 3D honeycomb. Instead of being solid, they contain lots of empty space, making them much lighter.

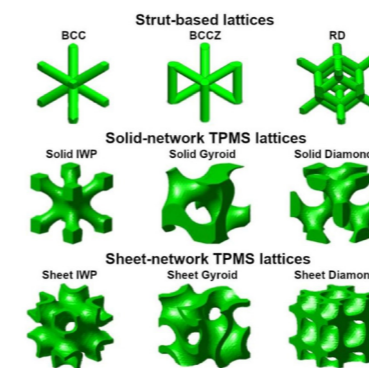


Figure 1. Strut-based and TPMS lattice structures.

THEY ARE TYPICALLY MADE IN TWO MAIN WAYS:

- Strut-based lattices are built from thin beams connected at nodes
- Surface-based lattices (TPMS) are smooth, continuous surfaces forming complex shapes

These shapes may look abstract, but their geometry strongly affects how they behave under load.

HOW ARE THESE STRUCTURES MADE?

At NU's additive Manufacturing lab, a metal alloy called AlSi10Mg (an aluminum-silicon material) is used to create and manufacture the structures using Selective Laser Melting, a 3D printing technique where a laser melts metal powder layer by layer. Figure 2 shows that the powder looks like tiny spherical particles, almost like fine sand, which fuse together during printing.

After printing, the material was heat-treated to improve its performance.

WHY DOES SHAPE MATTER?

When these structures are compressed (squeezed), they behave very differently depending on their design, as shown in Figures 3 and 4.

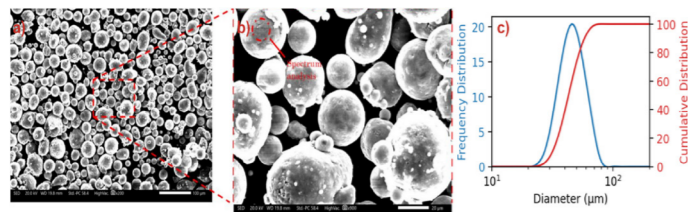


Figure 3. Deformation modes of strut-based lattice structures: BCC (a), BCCZ (b), RD (c).

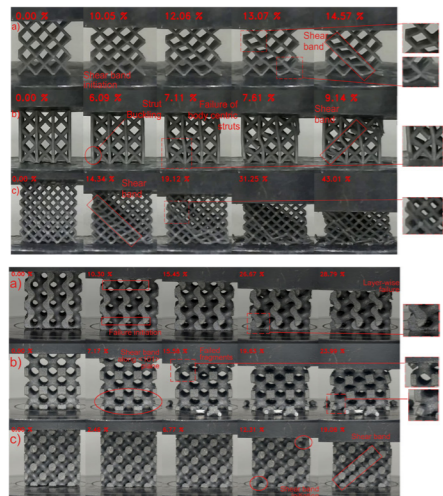


Figure 4. Deformation modes of TPMS-solid Gyroid (a), IWP (b), and Diamond (c) lattice structures.

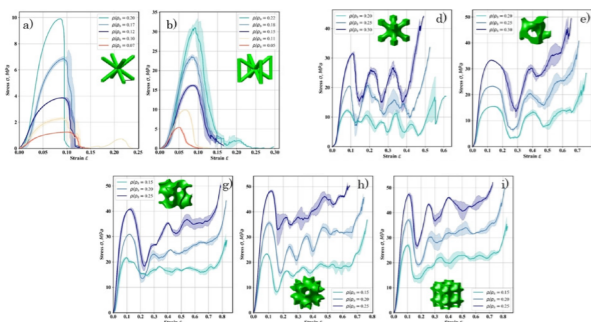


Figure 5. Strain-Stress curves.

Figure 5 shows a typical response to compression loading: At first, the lattice structure resists compression. Then it reaches a peak strength

After that, it may either collapse (Figure 5a, b, f) or gradually compress further (Figure 5c, d, e, g, h, i). Some structures fail suddenly (Figure 5a), while all others absorb energy more smoothly.

KEY FINDINGS: WHICH DESIGNS WORK BEST?

1. Sheet-based designs are the strongest

The study found that TPMS-sheet structures (especially Diamond shape) performed the best:

- High strength
- High stiffness
- Excellent energy absorption

For example, some designs could absorb large amounts of energy before collapsing, making them useful for impact protection.

2. Some structures fail too quickly

Certain designs, like:

- BCC (simple beam structures)
- BCCZ (beam structures with vertical supports)

Showed sudden failure after reaching peak stress, which limits their usefulness in applications like crash protection.

3. Deformation behavior matters

Some structures bend and collapse gradually (better energy absorption), while others break suddenly.

This difference explains why some designs are safer or more durable.

WHY IS THIS IMPORTANT?

These lightweight materials have huge potential: Automotive: crash absorbers that protect passengers

Aerospace: lighter components to save fuel

Medical implants: structures that mimic bone properties, such as strength and stiffness, can be adjusted to the patient's bone properties.

Interestingly, the study shows that aluminum lattices can be as strong as steel (for their weight), although titanium still performs best overall.

THE BIG TAKEAWAY

Not all lightweight materials are equal; their internal topology and geometry are just as important as the material itself.

- Smooth, surface-based designs lead to the best overall performance.
- Simple beam designs are cheaper but less efficient.
- Density and structure together determine the behavior of the lattice's structure.

As 3D printing advances, engineers can "design strength" directly into materials by carefully choosing their internal architecture.

FINAL THOUGHT

This research shows that the future of materials isn't just about what they're made of, but how they're manufactured. By designing smarter geometries, we can create materials that are lighter, stronger, and safer than ever before.

If you are interested in the topic, please find below publications from the Additive Manufacturing Lab on this topic:

- Controlling Mechanical Properties and Energy Absorption in AlSi10Mg Lattice Structures Through Solution and Aging Heat Treatments. [Read More](#)
- Experimental Investigation of Mechanical Properties and Energy Absorption Capabilities of Hybrid Lattice Structures Manufactured Using Fused Filament Fabrication. [Read More](#)
- SLM-Printed Lattice Structures with Tapered Vertical Struts: Design, Simulation and Experimentation. [Read More](#)

ADVANCING CARBON STORAGE: FROM SUBSURFACE PHYSICS TO PREDICTIVE MODELING OF CO₂ BEHAVIOR



SCHOOL OF MINING AND GEOSCIENCES

ID Professor Peyman Pourafshary, School of Mining and Geosciences, Nazarbeyev University

UNDERSTANDING HOW CO₂ BEHAVES UNDERGROUND

A group of MSc/PhD students under supervision of Dr Peyman Pourafshary and Dr Masoud Riazi have worked on advancing underground carbon storage. Different experimental and modeling approaches have been completed to study the CO₂ distribution and stabilization within the subsurface over time. Our research focuses on identifying the controlling mechanisms that govern this behavior in saline aquifers (Figure 1), with particular attention to wettability, flow regime, hysteresis, and geochemical reactions. Rather than treating these factors independently, the work evaluates how their interaction determines storage efficiency and long-term stability.

WETTABILITY AS A KEY CONTROL ON CO₂ MIGRATION

Wettability has been examined as a primary control on CO₂ migration, but our findings show that its effect cannot be interpreted in isolation. In water-wet systems, capillary forces restrict CO₂ movement and promote trapping at the pore scale. In contrast, weaker water-wet conditions allow more continuous CO₂ pathways and increase mobility. This difference has direct implications for both trapping and dissolution. We demonstrate that increased mobility can enhance CO₂-brine contact, which in turn supports dissolution and mineral trapping under certain conditions [1, 2]. These results indicate that higher mobility does not necessarily reduce storage security. To clarify these

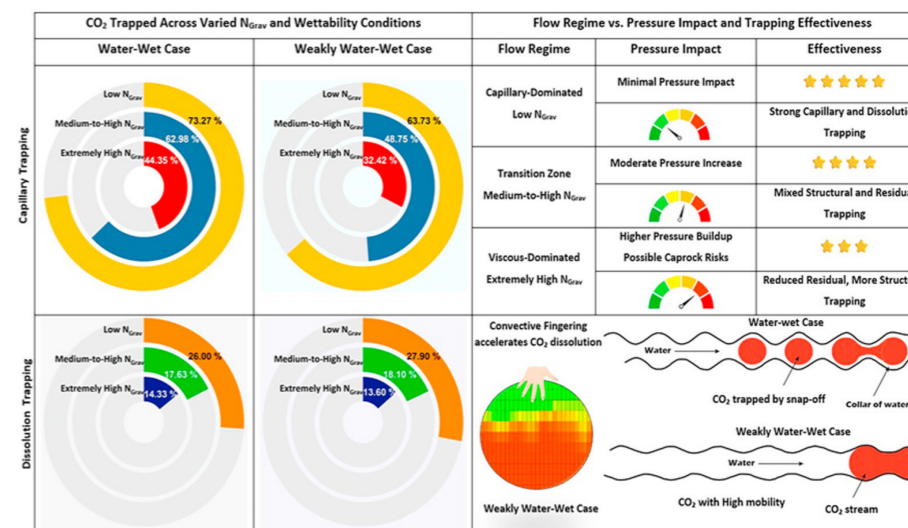


Figure 1. Schematic illustration of CO₂ trapping across gravity number (N_{Grav}) and wettability, showing capillary versus dissolution contributions, flow regimes, pressure response, and pore-scale mechanisms.

outcomes, the research extends beyond wettability and introduces flow regime as a governing framework. The balance between viscous, capillary, and gravitational forces is shown to control plume behavior [3]. Under gravity-dominated conditions, CO₂ remains in contact with brine for longer periods, which promotes dissolution even when capillary trapping is limited. At the same time, geological heterogeneity modifies this behavior by redirecting flow and creating localized trapping zones (Figure 2). These results highlight that storage efficiency depends on how flow regimes interact with reservoir structure, not on wettability alone.

HYSTERESIS AND LONG-TERM STORAGE STABILITY

“Neglecting hysteresis leads to an overestimation of CO₂ mobility and an underestimation of residual trapping.”

Another key contribution of this work is the evaluation of hysteresis in relative permeability, which introduces path dependence into CO₂ migration (Figure 3). After injection, the transition from drainage to imbibition alters the flow properties of the system and affects the amount of CO₂ that becomes immobilized. We show that neglecting hysteresis leads to an overestimation of CO₂ mobility and an underestimation of residual trapping [4, 5]. This has important implications for long-term predictions, where small differences in trapping behavior accumulate over time.

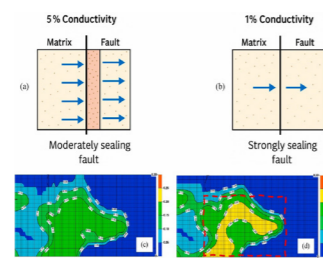
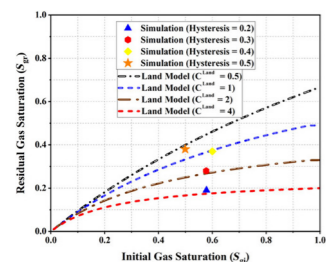


Figure 2. Fault sealing effects on CO₂ flow and trapping: (a–b) 5% and 1% faults reducing lateral flux; (c–d) resulting capillary trapping after 10 years, with enhanced up-dip retention in the 1% case.

Figure 3. Relationship between initial and residual CO₂ saturations under varying hysteresis, fitted with Land’s trapping coefficient (C_{Land}).

In addition to physical processes, the research examines reactive transport mechanisms that contribute to permanent CO₂ storage. Dissolution of CO₂ in brine leads to acidification and initiates mineral reactions that can convert CO₂ into stable carbonate phases. Temperature and salinity alter reaction pathways and influence the rate of mineral trapping [6]. Temperature controls how CO₂ partitions between free and dissolved phases, which affects both transport and long-term stabilization [7]. To complement physics-based modeling, the work also incorporates data-driven

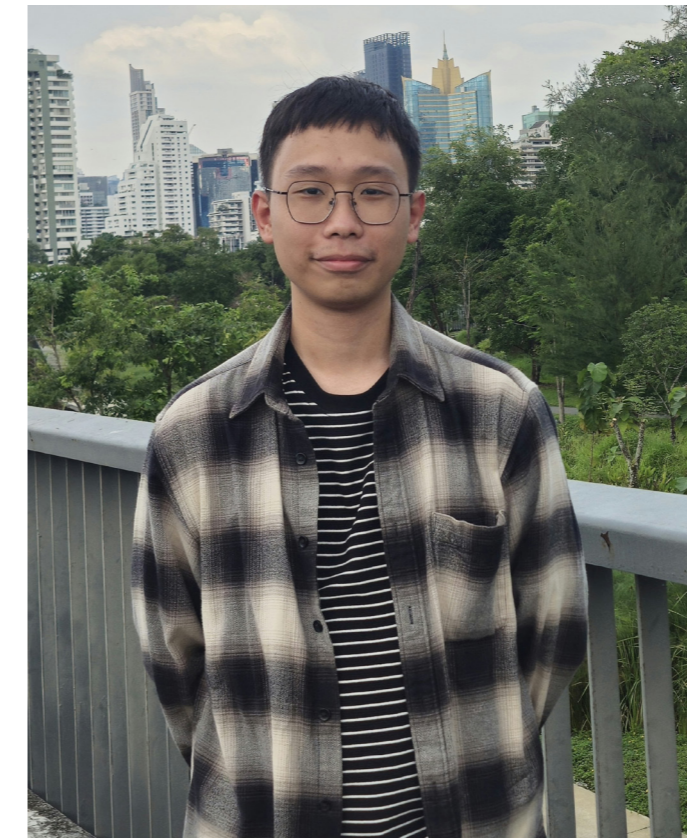
approaches. We developed predictive models for CO₂ diffusion as a function of salinity and reservoir conditions. These models provide a practical tool for estimating transport properties without relying on repeated laboratory measurements or computationally intensive simulations [8].

TOWARD RELIABLE LONG-TERM CARBON STORAGE

Across these studies, CO₂ storage performance emerges from interacting processes rather than a single controlling mechanism. Capillary trapping, dissolution, mineralization, and flow redistribution act together, with wettability, hysteresis, flow regime, and geochemical conditions shaping their balance. This integrated perspective improves prediction of storage behavior and supports more reliable design and assessment of long-term CO₂ storage in saline aquifers.

1. Khoramian, R., Salaudeen, I., Pourafshary, P., Riazi, M. and Kharrat, R., “Wettability-Driven Variations in CO₂ Trapping: Coupled Impact of Capillary Forces and Reactive Transport in Saline Aquifers” 2025, DOI:10.2118/230344-MS
2. Khoramian, R., Salaudeen, I., Pourafshary, P., Riazi, M., Kharrat, R., “Impact of wettability on CO₂ mineral trapping in carbonate saline aquifers: A reactive transport simulation study” Greenhouse Gases: Science and Technology, 2026, <https://doi.org/10.1002/ghg.2387>
3. Khoramian, R., Salaudeen, I., Pourafshary, P., Riazi, M., Kharrat, R., “Beyond wettability: Flow regime and geological heterogeneity controls on CO₂ trapping efficiency and dissolution behavior in saline aquifers” Journal of Cleaner Production, 2026, DOI:10.1016/j.jclepro.2026.147584
4. Khoramian, R., Pourafshary, P. and Riazi, M. “The Role of Capillary Hysteresis in Enhancing CO₂ Trapping Efficiency and Storage Stability”. Kazakhstan journal for oil & gas industry, 2024, DOI: <https://doi.org/10.54859/kjogi108781>
5. Khoramian, R., Salaudeen, I., Pourafshary, P., Riazi, M., Kharrat, R., “Impact of relative permeability hysteresis on CO₂ storage in saline aquifers” Greenhouse Gases: Science and Technology, 2025, <https://doi.org/10.1002/ghg.2319>
6. Khoramian, R., Issakhov, M., Pourafshary, P., Aidarova, S., Sharipova, A., “Reactive Transport Modeling of CO₂ Trapping in Carbonate Saline Aquifers: Coupled Effects of Wettability, Temperature, and Salinity on Mineralization and Storage Efficiency” Fuel, 2026, <https://doi.org/10.1016/j.fuel.2025.137038>
7. Salaudeen, I., Khoramian, R., Riazi, M., Pourafshary, P., Cortés, F., “Prolonged impact of temperature on CO₂ dissolution in finite heterogeneous saline aquifers” Energy & Fuels, 2026, 40(4), 2075–2090 [Read more](#)
8. Khan, Q., Pourafshary, P., Hadavimoghaddam, F., Khoramian, R., “Machine Learning Prediction of CO₂ Diffusion in Brine: Model Development and Salinity Influence Under Reservoir Conditions” Applied Sciences, 2025, <https://doi.org/10.3390/app15158536>

TOP 1% NU MASTER’S STUDENT PUBLISHES FIVE RESEARCH PAPERS IN ONE YEAR



ID Eriko Dewangga,

A Master’s student at Nazarbayev University graduating in June 2026, has ranked in the top 1% of his class and co-authored five high-quality research papers within one year. His research in geotechnical engineering focuses on soil-water behavior, permeability, slope stability, and freezing characteristics of soils, with several papers published or accepted in Q1 Scopus-indexed journals.



SCHOOL OF ENGINEERING AND DIGITAL SCIENCES

Eriko was invited to Universitas Airlangga, Indonesia, in June 2025 as a researcher contributing to innovative solutions for geotechnical hazard monitoring. There, he presented work on unsaturated soil mechanics, pile design, and the GeoBarrier System, and also introduced students to academic opportunities and student life at Nazarbayev University. In November 2025, he was also invited to present at the short course “Nature-based Solutions for Disaster Risk Reduction in Southeast Asia”, held at Kasetsart University in Thailand, where he delivered a presentation on the **Capillary Barrier System** using sustainable materials.



Picture 1. Presentation on Capillary Barrier System at Kasetsart University in Thailand

SOIL DENSITY IMPACT ON SOIL-WATER CHARACTERISTIC CURVE AND PORE-SIZE DISTRIBUTION

KEY FINDINGS

- Engineered soil from Astana was tested under three compaction states: dry of optimum, at optimum moisture content, and wet of optimum.
- Soils compacted at optimum and dry of optimum moisture content showed bimodal soil-water characteristic curves, whereas wet-compacted soil showed unimodal behavior.
- Increased dry density was associated with reduced air-entry value and lower water content, while lower density corresponded to larger dominant pore sizes and higher matric suction.
- The study linked hydraulic behavior with pore-scale observations using scanning electron microscopy, helping explain how compaction reshapes pore structure and affects moisture retention.
- The results are relevant for road and pavement engineering, flood mitigation, green infrastructure, and sustainable urban geotechnical design.

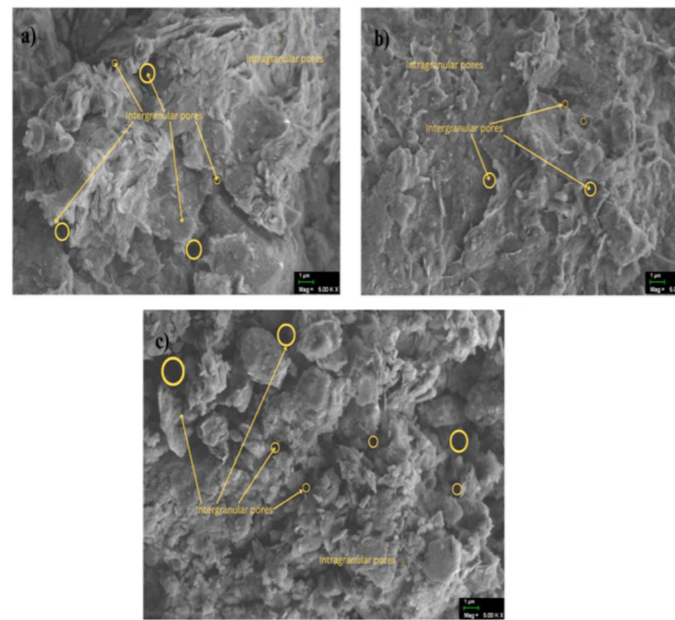


WHY IT MATTERS

Understanding how soils respond to compaction and moisture is essential for building more resilient cities under changing climate conditions. This research helps improve predictions of subgrade performance, drainage, deformation, and slope behavior, supporting better design of pavements, bioretention systems, permeable surfaces, and other forms of climate-adaptive infrastructure.



Picture 2. Extracting soil samples from a construction site in Astana



Picture 3. SEM pictures of sample AS3: (a) before drying (b) after drying (c) wetting.

TO LEARN MORE ABOUT ERIKO DEWANGGA'S RESEARCH CONTRIBUTIONS, PLEASE SEE THE PUBLICATIONS BELOW:

1. Soil density impact on soil-water characteristic curve and pore-size distribution. *Frontiers in Built Environment*, 11, 1661375. Q1. DOI: <https://doi.org/10.3389/fbuil.2025.1661375>
2. Soil-water characteristic curve and permeability function of concrete waste. *Frontiers in Built Environment*, 11, 1674281. Q1 DOI: <https://doi.org/10.3389/fbuil.2025.1674281>
3. Estimation of soil suction from field measured water content. *Bulletin of Engineering Geology and the Environment*, 85, 197. Q1 DOI: <https://doi.org/10.1007/s10064-026-04805-6>
4. Rainfall duration effect on slope stability of unsaturated silty sand soil. *Frontiers in Built Environment*, 11, Q1 DOI: <https://doi.org/10.3389/fbuil.2025.1680297>
5. The development of soil freezing characteristic curves for fine-grained soils classified according to the USCS. (Accepted for oral presentation and to be published in the proceedings of the 21st International Conference on Soil Mechanics and Geotechnical Engineering, Vienna, Austria.)

INVITED RESEARCHER ON INNOVATIVE SOLUTIONS FOR GEOTECHNICAL HAZARD MONITORING IN UNIVERSITAS AIRLANGGA, SURABAYA, INDONESIA IN JUNE 2025 (QS WORLD RANK #287)

- Delivered a presentation on the application of unsaturated soil mechanics to pile design and a sustainable retaining wall system, the GeoBarrier System
- Provided short lectures on polymer sensor
- Shared information about Kazakh culture, student life, and academic opportunities at Nazarbayev University

NU BACHELOR STUDENTS CO-AUTHOR RESEARCH PAPER SHOWING HOW APPLIED MATHEMATICS CAN ADVANCE MEMS DESIGN



ID Alen Abdildayev



ID Selim Onaibekov

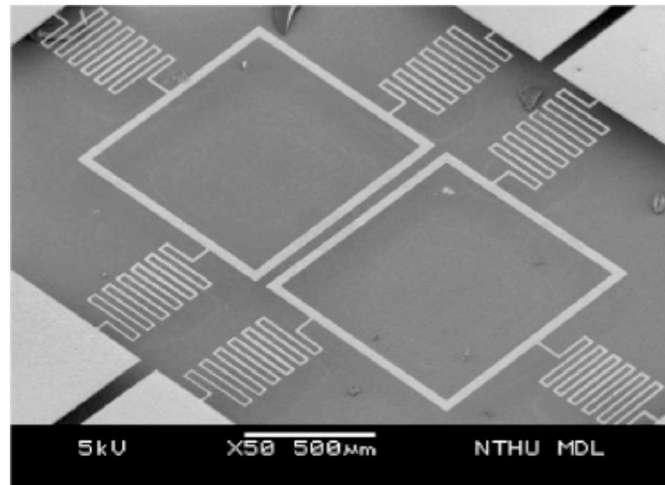


SCHOOL
OF SCIENCES
AND HUMANITIES

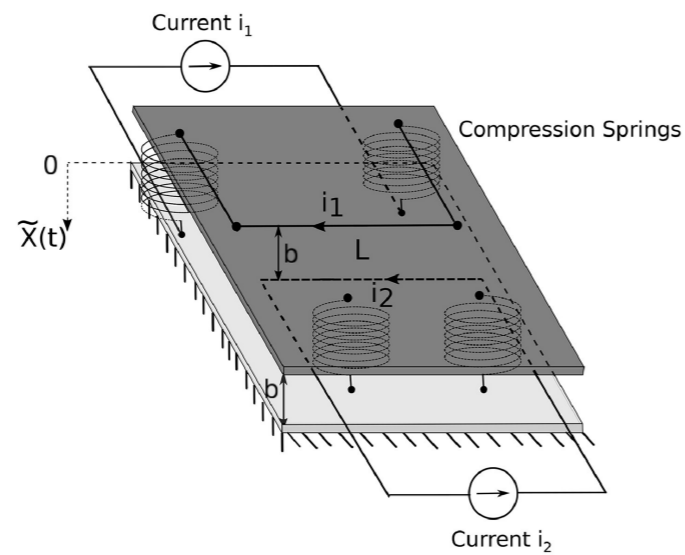
Two NU Bachelor's Students Mathematics, Alen Abdildayev and Selim Onaibekov, have shown how advanced mathematical analysis can make a practical contribution to engineering design. As co-authors of the paper "*Periodicity and pull-in instability in current-driven magMEMS: a Sturm's theorem approach*," they contributed to research that addresses one of the key challenges in the operation of micro-electro-mechanical systems: determining when a device remains stable and when it suddenly collapses due to pull-in instability. The paper was published in the *Journal of Sound and Vibration*, (Q1 top 5%, Impact Factor 4,9. Cite Score 10,2) [Read more](#)

HIGHLIGHTS

- magMEMS prototype driven by current-carrying filaments
- Analysis of magMEMS oscillator model with damping term
- Detection of pull-in or periodic solutions by using Sturm's Theorem
- Numerical illustrations of theoretical findings using Julia code
- Valuable insights for MEMS designers without time consuming finite Element Analysis



(a) SEM photos of two statically decoupled oscillators [58]



(b) magMEMS model with current-carrying filaments

Fig. 1. The current-driven magMEMS and its model.

Their contribution was based on the outcomes of their RA activities under supervision of **Dr. Piotr Skrzypacz** (Mathematics Department) in the **Laboratory for Electro-Mechanics and Mathematics with Applications (LEMMA)** C4 303. The work is essential to determine the pull-in instabilities for Micro-Electro-Mechanical Systems (MEMS).

The operation of MEMS is influenced by a pull-in effect that arises at specific thresholds of actuation parameters. Accurate detection and a priori knowledge of the exact pull-in threshold are essential for the design and operation of MEMS devices. Dynamic pull-in phenomena in actuators result from combinations of kinetic and potential energy that ultimately cause the moving structure to collapse. **Alen Abdildayev** and **Selim Onaibekov**, former Bachelor Students of Mathematics at Nazarbayev University (NU), applied interpolation methods and Sturm's theorem to identify dynamic pull-in in a magMEMS model of current-carrying conductors.

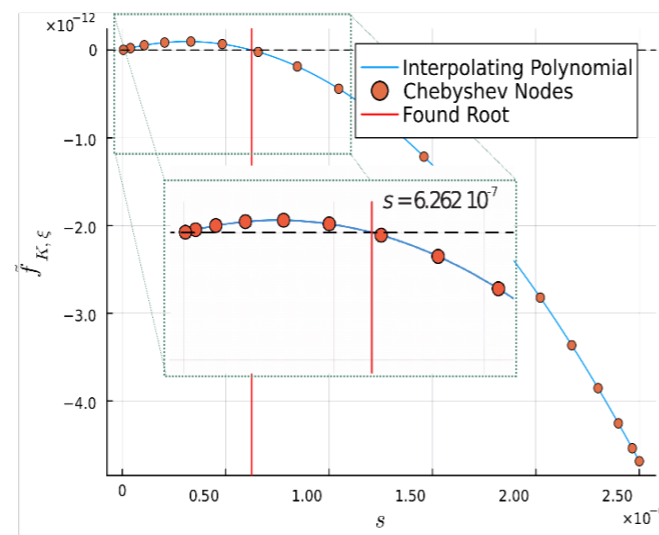


Fig. 3. Data-driven root identification.

The work was done in cooperation with the Wrocław University of Science and Technology, Faculty of Electronics, Photonics and Microsystems, ul. Janiszewskiego 11/17 50-372 Wrocław, Poland. This research has been conducted in the Laboratory for Electro-Mechanics and Mathematics with Applications (LEMMA) C4 303 of **Dr. Piotr Skrzypacz** and **Dr. Grant Ellis**, and has been supported by the Ministry of Education and Science of the Republic of Kazakhstan within the framework of Project AP19676969 "Modeling, Analysis and Optimization of MEMS and magMEMS". Research activities of LEMMA in the field of Applied Mathematics already led to exciting works about MEMS and intensified international cooperation of NU with research group in Poland.

Selim Onaibekov continues his research journey as a master's student in the Applied Mathematics MS program at Nazarbayev University (NU), while Alen Abdildayev is a master's student in Statistics at Boston University.

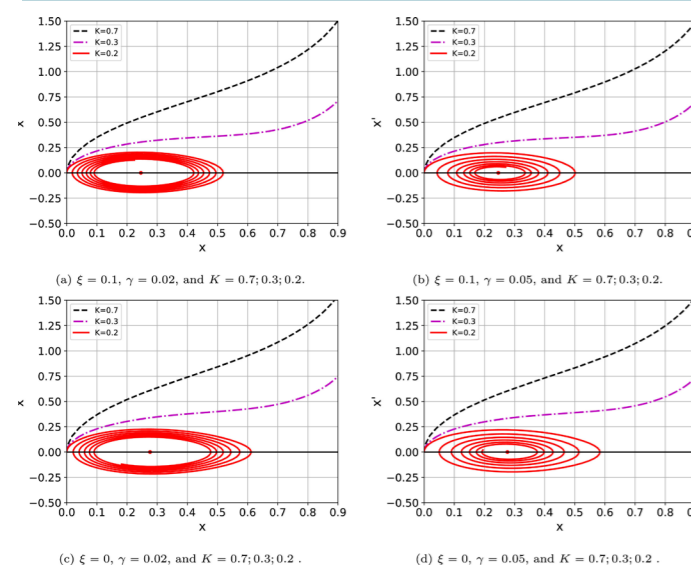


Fig. 2. Phase trajectories for magMEMS model with damping.

UNIVERSITY RESEARCH LIFE

Events, initiatives and moments
that shape the research community
at Nazarbayev University.

NUGSE NEWS | SPOTLIGHT ON SUCCESS: FROM AI-DRIVEN SUSTAINABILITY TO GLOBAL EDITORIAL LEADERSHIP



SPOTLIGHT ON SUCCESS



As a PI, Assistant Professor at NUGSE Guzhanat Gafu was awarded a 2026–2028 Faculty Competitive Development Grant for her project titled “AI-Assisted Co-Creation of Climate Curriculum for Higher Education in Kazakhstan: Grounding Sustainability in Kazakh Cultural and Linguistic Knowledge.” The project focuses on designing and piloting an AI-assisted climate curriculum for higher education in Kazakhstan that is grounded in Kazakh cultural and linguistic knowledge. This research will be conducted in close collaboration with ISSAI and Kazakh language department at NU.

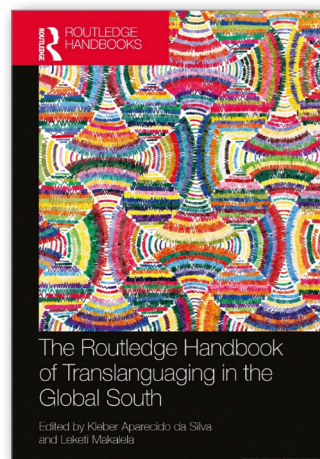


Recently, Dirlabo Jonbekova, Associate Professor at the Graduate School of Education, joined the Editorial Board of Studies in Higher Education journal. Starting from April 2026, she also became an Associate Editor of Higher Education Research & Development journal.



This year, Anas Hajar, Associate Professor at the Graduate School of Education, joined the Editorial Board of TESOL Quarterly journal.

RESEARCH SNAPSHOTS

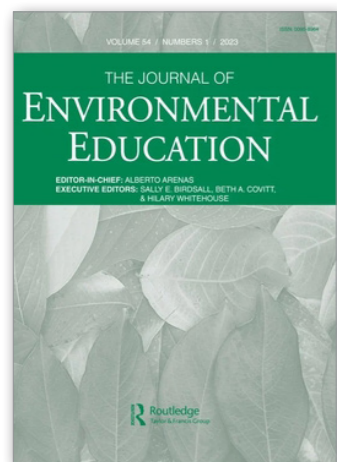


Goodman, B., & Manan, S. A. (2026). Translanguaging policies, beliefs, and practices in Kazakhstan: A critical review. In K. A. da Silva & L. Makalela (Eds.), *The Routledge handbook of translanguaging in the Global South* (pp. 44-60). Routledge. [Read More](#)

a. Routledge defines its Handbooks in Applied Linguistics as providing “comprehensive overviews of the key topics in applied linguistics...specially commissioned and written by leading scholars in the field.”

b. The chapter contains a critical synthesis of research on translanguaging in Kazakhstan conducted primarily by GSE MA graduates as well as 1 PhD graduate and two faculty members

c. The chapter interprets these empirical findings in relation to Global South epistemologies and decolonizing practices.



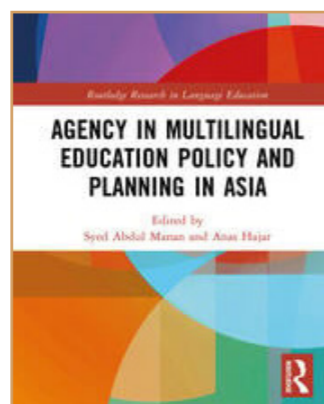
A paper by NUGSE Assistant Professor Gulzhanat Gafu, co-authored with Daniel Hernández-Torrano and Roza Sagitova, on students’ sustainability behaviours was published in the *Journal of Environmental Education*. The study used latent profile analysis to classify students based on their values and behaviours. Gafu, G., Sagitova, R., & Hernández-Torrano, D. (2026). From attitudes to action:

How universities shape student sustainability behaviors in Kazakhstan. *The Journal of Environmental Education*, 1-16. [Read More](#)



A paper by NUGSE Associate Professor Dilrabo Jonbekova, co-author with GSE PhD and Master’s graduates and GSE partner from the University of Pennsylvania, was published in the *Journal of Further and Higher Education*. Jonbekova, D., Kuchumova, G., Hartley, M., & Ippolitova, M. (2026). University-industry partnerships’ contribution to regional development. *Journal of Further and Higher Education*, 50(2), 310-332. [Read More](#)

Further and Higher Education, 50(2), 310-332. [Read More](#)



Manan, S. A., & Hajar, A. (2025). *Agency in Multilingual Education Policy and Planning in Asia*. New York: Taylor & Francis (Routledge)

Agency in Multilingual Education Policy and Planning in Asia explores how educators and local actors exercise agency within structurally constrained, yet highly multilingual Asian contexts. Drawing on contemporary theoretical frameworks and contextualized empirical research, the volume shows how individual and collective agency fosters inclusive, translanguaging pedagogies, reshapes policy discourses, and challenges entrenched postcolonial and bureaucratic structures. This book was inspired by the need to highlight the often-underestimated agency of micro-level educators and local actors in shaping multilingual education policy, particularly in Asian contexts where such agency-focused research remains under-explored. Bringing together scholars from diverse multilingual settings across South, Southeast, and Central Asia, as well as China, Hong Kong, and Australia, the volume examines how these actors actively interpret, negotiate, and recreate policy within often stringent language education regimes. It demonstrates how educators/teachers exercise agency to negotiate policies, affirm multilingual identities, and implement locally responsive practices, while emphasizing the power of reflective and collective action to challenge postcolonial hierarchies and influence broader policy, and pointing toward future research on collective agency, educators’ personal histories, and decolonial approaches to issues such as English-medium fever and Anglonormativity. [Read More](#)



Sage Journals

Çalıkoğlu, A., Uslu, B., Aypay, A., & Sagintayeva, A. (2026). Universities’ roles in regional development and evaluating their quality: A systematic literature review. *Industry and Higher Education*. As part of the Strengthening Regional Universities in Kazakhstan (CARCEIT) project, we recently published a systematic review of how universities’ contributions to regional development are conceptualized and evaluated in the *Journal of Industry and Higher Education* (Q1). The study shows that existing research predominantly focuses on economic outcomes, with more limited attention to societal and environmental dimensions. It also highlights challenges in assessing these contributions, as evaluations often rely on descriptive and output-based indicators. The findings point to emerging efforts toward more structured and context-sensitive approaches. The study calls for more balanced policies and the development of nuanced, contextually grounded evaluation frameworks. [Read More](#)

NU IN GLOBAL RESEARCH LANDSCAPE

A paper by NUGSE Associate Professor Gulzhanat Gafu, co-authored with Olga Mun and Anuar Aizuddin, entitled “Obal and Budi Philosophies as Reparative Visions of Sustainability in Higher Education: A Creative Manifesto,” was awarded the Best Paper Award at the E/CA SIG of CIEC 2026. In this paper we took a creative approach to exploring indigenous philosophies of Obal and Budi to reimagine sustainability education and offer these as a reparative approach to teaching sustainability in non-western contexts. [Read More](#)



GRADUATE SCHOOL OF EDUCATION



NUGSE AT CIES 2026: STRONG GLOBAL PRESENCE AND RECOGNITION

NUGSE demonstrated a strong and visible presence at the Comparative and International Education Society (CIES) 2026 conference in San Francisco, delivering nearly 20 presentations alongside multiple panels and special events. Faculty and student contributions attracted significant interest and engagement from an international audience.

A key highlight was the NUGSE-organized reception on the role of flagship universities in emerging economies. The panel featured Darkhan Bilyalov, Maia Chankseliani, and Hei-hang Hayes Tang, and was moderated by Aliya Kuzhabekova. The session drew a full room, sparked lively discussion, and stood out as one of the most engaging events of the conference, generating new collaborations and professional connections.

NUGSE alumni and regional colleagues from Central Asia also played an active role, reinforcing the region’s growing visibility in global education research. Upcoming initiatives, including EHELF 2026 and the GSE Teaching Conference, further attracted interest and helped expand NUGSE’s international network.

The conference also brought notable recognitions:

- Professor Gulzhanat Gafu received the Best Paper Award (E/CA SIG) for research on sustainability and indigenous philosophies in higher education.
- Professor Kairat Kurakbayev was awarded a travel grant supported by the Harriman Institute at Columbia University.
- Doctoral student Askhat Makhmetov received a travel award for research on teachers’ well-being in Kazakhstan.

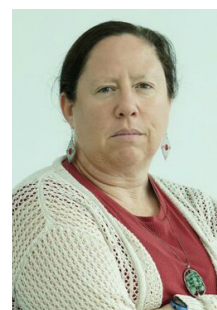
These achievements highlight NUGSE’s growing impact, strong research agenda, and active contribution to global academic dialogue.

GSE FACULTY ON INTERNATIONAL EDITORIAL BOARDS

The Graduate School of Education proudly recognises its professors who serve on the editorial and advisory boards of leading international and regional academic journals. These appointments reflect their strong academic reputation, global expertise, and important contribution to shaping high-quality research in education. [Read More](#)



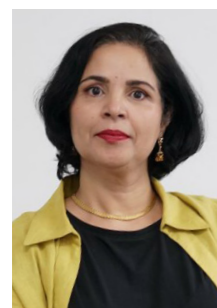
Dilrabo Jonbekova
Studies in Higher Education, Editorial Board Member
Higher Education Research and Development, Associate Editor
Journal of Comparative and International Higher Education, Member of International Advisory Board
Central Asia Higher Education Review, Editorial Board Member



Bridget Goodman
Journal of Multilingual Theories and Practices, Associate Editor



Afzal Mir
Journal of Education and Educational Development (JoEED), Advisory Board Member



Naureen Durrani
Compare: A Journal of Comparative and International Education, Editorial Board Member



Janet Helmer
British Journal of Special Education, Editorial Board Member



Ahmet Aypay
AERA Open (Sage), Editorial Board Member
Leadership & Policy in Schools, Editorial Board Member
Research on Educational Leadership and Management (REAL), Advisory Board member
School Administration, Editorial Board Member
Central Asia Higher Education Review, Editorial Board Member



Oliver Mutanga
Africa Education Review, Advisory Board Member
Educational Research and Evaluation, Editorial Board Member
African Journal of Disability, Editorial Board Member
Journal of Ubuntu, Editorial Board Member



Daniel Torrano
Gifted Education International, Editorial Board Member
Journal of Advanced Academics, International Review Board Member



Gulzhanat Gafu
Central Asian Survey, Editorial Board Member



Philip Montgomery
TESOL Quarterly, Editorial Board Member



Anas Hajar
TESOL Quarterly, Editorial Board Member
ECNU Review of Education (SAGE), Editorial Board Member



Zumrad Kataeva
Gender, Work & Organization, Editorial Board Member



Sulushash Kerimkulova
NUGSE Research in Education Journal (NUGSERIE), Editorial Board Member



Alper Calikoglu
Higher Education Governance and Policy, Editorial Board Member
Journal of University Research, Editorial Board Member

NU SDSN NEWS: SHAPING SUSTAINABLE FUTURES BEYOND 2030

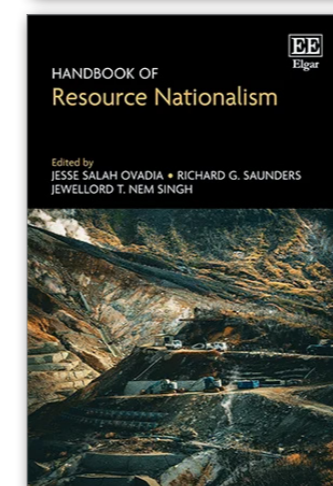


GRADUATE SCHOOL OF PUBLIC POLICY



SDSN Kazakhstan Publishes Policy Brief on the Post-2030 Sustainability Agenda (March 2026)

This policy brief aims to analyze the current state of the sustainability agenda in Kazakhstan, assess key achievements and structural constraints, and develop forward-looking policy recommendations to inform the country's post-2030 sustainability strategy in response to evolving economic, social, and environmental pressures. [Read More](#)



New Publication: The Handbook on Resource Nationalism (February 2026)

The volume Handbook on Resource Nationalism provides a timely discussion on raw materials-based industrial policies in the Global South and examines supply chain security for mineral consumers in Europe and the United States.

Dr. Serik Orazgaliyev, Co-Chair of SDSN Kazakhstan, in co-authorship with Dr. Mereke Tanaguzova and Arman Mussin, contributed to this volume by sharing insights on Kazakhstan's oil and gas sector. [Read More](#)



New Research Article on Sustainability (March 2026)

Dr. Scott Victor Valentine, Professor at the Graduate School of Public Policy, has published a new article titled "If You Build It, Will They Come? Economic Revitalization in Kamikatsu, Japan." The study examines the development of a zero-waste center as the flagship project of an initiative aimed at promoting sustainable development and boosting inbound tourism in Kamikatsu, Japan. [Read More](#)

GENDER AND HIGHER EDUCATION: A BIBLIOMETRIC ANALYSIS OF GLOBAL RESEARCH TRENDS



A recent study titled “Gender and Higher Education: A Bibliometric Analysis of Global Research Trends” has been published in a leading Q1 journal, offering a comprehensive overview of global scholarship on gender in higher education. The study employs a bibliometric approach to systematically map the development, patterns, and key themes in gender-related research within higher education. By analysing large-scale publication data, the research identifies significant growth in scholarly attention to gender issues, particularly in recent years, reflecting the increasing global concern for equity and inclusion in academic spaces. The findings highlight that research output is heavily concentrated in countries such as the United States and the United Kingdom, and in other Western contexts, while contributions from the Global South are emerging but remain comparatively limited. The study also reveals evolving thematic priorities, including gender equality, representation in STEM fields, and institutional policies to reduce disparities. Importantly, the paper underscores ongoing challenges in achieving gender equity in higher education, despite the expansion of research and policy attention. It calls for stronger international collaboration and more inclusive research agendas that better represent diverse regional perspectives and contexts. This research contributes to a deeper understanding of how gender-related knowledge is produced and disseminated globally in higher education. It offers valuable insights for policymakers, researchers, and institutions seeking to promote more equitable and inclusive higher education systems. Read the full article here. [Read More](#)

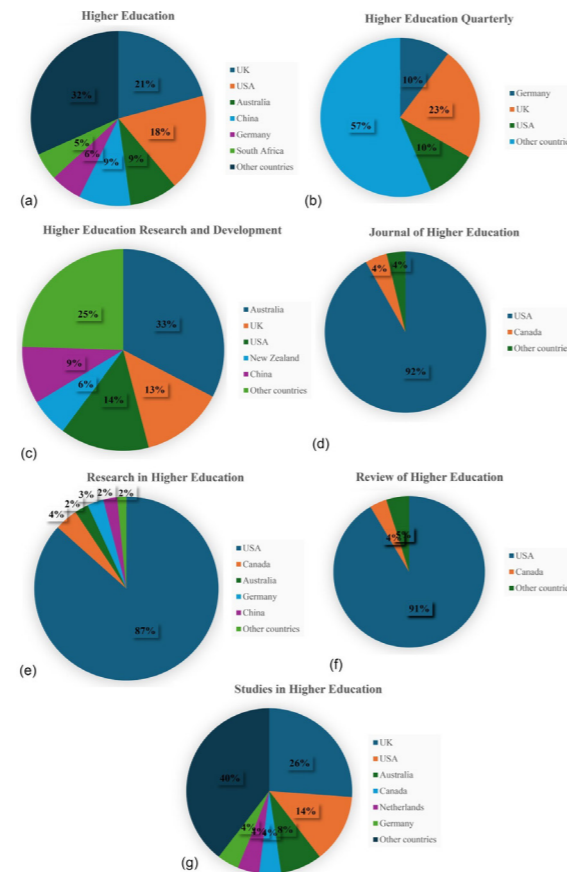


Figure 1. Countries' contributions to gender-related research in higher education.

ETHICAL RESEARCH WITH YOUNG CHILDREN: INSIGHTS FROM A KAZAKHSTAN-BASED STUDY

This study, published in a Q1 journal, explores the complexities of conducting ethical research with young children in early childhood education settings through a collaborative autoethnographic approach. Drawing on the lived experiences of a research team working in kindergartens in Kazakhstan, the study highlights the emotional, practical, and ethical challenges involved in engaging with young participants. It underscores the importance of flexibility in research design, cultural sensitivity, and ongoing ethical reflexivity when working with vulnerable populations. Using multiple reflective data sources, including journals, group discussions, and informal communications, the authors show how research



practices must adapt to real-world contexts. The paper emphasises the need for culturally responsive and context-aware methodologies, particularly in settings where early childhood research is still developing and offers practical guidance on maintaining ethical integrity. Overall, the study offers valuable insights into responsible research practices and contributes to strengthening ethical approaches in early childhood research. The paper can be accessed by clicking here. [Read More](#)

UNIVERSITIES' ROLE IN REGIONAL DEVELOPMENT: NEW SYSTEMATIC REVIEW HIGHLIGHTS EVALUATION CHALLENGES

This Q1 journal article, “Universities’ roles in regional development and evaluating their quality: A systematic literature review,” explores how universities contribute to regional development and how the quality of these contributions is assessed across different contexts. Drawing on peer-reviewed literature, the study shows that universities are increasingly expected to play broader roles that extend beyond economic growth to include societal and environmental contributions. However, the review finds that existing evaluation approaches remain heavily centred on financial performance and descriptive output indicators, with relatively limited attention to the wider social and environmental impact of university engagement. The authors also highlight the complexity of university–region relationships and the practical challenges of data collection, which often constrain more comprehensive assessment. At the same time, the paper notes that some studies are beginning to adopt more structured and context-sensitive evaluation approaches. Overall, the study calls for national and institutional policies that support more balanced and nuanced quality indicators, offering valuable insights for strengthening how universities’ regional roles are understood and evaluated. [Read More](#)

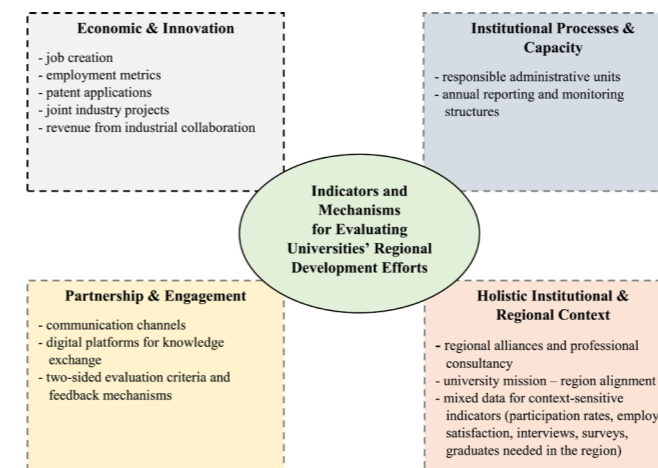


Figure 2. Conceptual dimensions for evaluating universities' regional development efforts (Source: Authors' own elaboration based on systematic review findings).

IMPLEMENTING POSITIVE PEACE EDUCATION IN SCHOOLS: A SYSTEMATIC LITERATURE REVIEW OF GLOBAL PRACTICES

The paper, published in a Q1 journal (99th percentile), offers important insights into how peace education is conceptualised and enacted in educational settings worldwide. The study provides the first critical interpretive synthesis of positive peace education (PPE), drawing on global literature and building on Johan Galtung’s theory of positive peace to examine how schools address not only direct violence but also structural and cultural forms of violence through education. The findings identify key dimensions of PPE en-



actment, including context-specific practices, pedagogical balancing, and the agency of teachers and students, highlighting that peace education is a dynamic and locally negotiated process rather than a fixed model. The paper further reconceptualises peace education as an ethical and relational practice, integrating perspectives such as the ethics of

care and linking global policy frameworks, including UNESCO’s, with classroom-level realities. Overall, the study advances the field by offering a nuanced, context-aware understanding of how education can foster sustainable and socially just peace, providing valuable guidance for educators, policymakers, and researchers. [Read More](#)

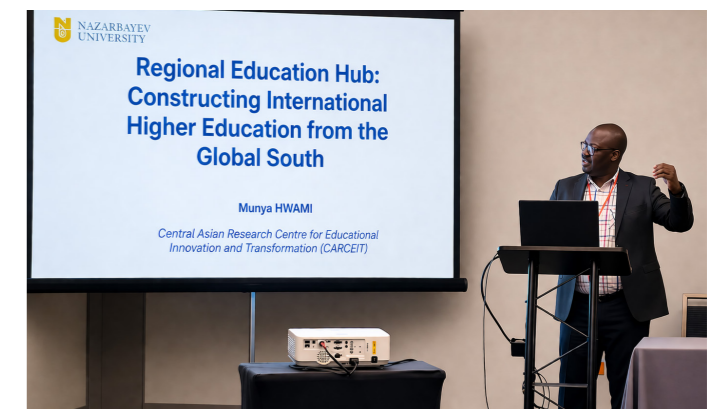
CONFERENCES

CARCEIT-FUNDED RESEARCH PRESENTED AT CIES 2026

Associate Professor Munya Hwami presented his paper, “Regional Education Hub: Constructing International Higher Education from the Global South,” at CIES 2026. The presentation examined the emergence of Kazakhstan as a regional education hub, with a particular focus on Nazarbayev University.

Drawing on a qualitative case study, the research explored the origins, motivations, and experiences of international students studying at Nazarbayev University. The findings highlighted that, while the university attracts a diverse student body, particularly from countries such as Pakistan and Nigeria, it remains strongly influenced by Western academic models.

The study further revealed the hybrid nature of education at Nazarbayev University, where Western-style curricula and international faculty intersect with local contexts. However, it also raised critical concerns about epistemic imbalance, particularly the limited representation of local knowledge systems and Global South perspectives.



This important research contributes to ongoing debates on South–South internationalization and the role of emerging education hubs in reshaping global higher education dynamics.

The research was funded by the Central Asian Research Centre for Educational Innovation and Transformation (CARCEIT).

CARCEIT published an impact narrative on “Nurturing Young Minds: Strengthening Child Health and Well-being Through Early Childhood Education.”

Why was this research necessary?

Over the past decade, Kazakhstan has made a major national investment in early childhood education, achieving near-universal access for children aged 3 to 6. This expansion reflects a strong policy commitment to early education as a foundation for long-term social and economic development. International evidence supports this investment, showing that

high-quality early childhood education delivers substantial long-term benefits. On average, every dol-

lar invested returns about seven dollars to society through better health, stronger learning outcomes, higher productivity, and reduced public costs.

However, access alone does not guarantee these returns. Despite high participation, national evidence indicates that the quality of everyday experiences in many kindergarten settings remains limited, suggesting that the conditions needed to fully realize these benefits are not yet consistently in place. At the same time, early childhood education, as in many other countries, continues to focus mainly on cognitive development and school readiness, while children’s health and well-being receive far less systematic attention, despite their central role in learning and holistic development.

This project directly addressed this gap by generating the first comprehensive, child-centred evidence base on health and well-being in early childhood education settings in Kazakhstan. It was designed to inform policy and practice with empirically grounded, actionable insights to promote the holistic development of young children in Kazakhstan.

What changed as a result of this work?

The project established a child-centred evidence



base on well-being in early childhood education settings in Kazakhstan and brought children’s perspectives into national discussions on quality and reform. The research provided policymakers and practitioners with concrete insight into how young children experience their daily lives in kindergartens, strengthening understanding of health and well-being as it is lived in early childhood settings.

The findings generated greater clarity about how health and well-being are experienced in practice and the importance of everyday experiences within kindergartens, including opportunities for joyful engage-

ment, supportive interactions, and environments that enable positive daily experiences. This helped shift policy and professional discussions away from abstract notions of well-being toward aspects of early childhood provision that can be shaped through standards, guidance, and professional practice.

This project also showed that children’s well-being is multidimensional and varies across meaningful profiles, indicating that uniform approaches to promoting well-being are unlikely to be effective. This evidence

supports a more responsive, differentiated strategy within early childhood provision and strengthens the conceptual foundations of national quality frameworks.

The identification of high-impact well-being indicators represents a particularly significant contribution. These indicators provide policymakers with a clear empirical basis for prioritisation, strengthening monitoring and evaluation frameworks, and efficient use of public resources. As a result, the project has laid the groundwork for sustained system-level improvements in child health and well-being.

How did the research lead to this change?

A key driver of the project’s impact was strong national and international collaboration, bringing together expertise from NUGSE, CARCEIT, and international partners from the Centre for Wellbeing Science (CWS) and the Research in Effective Education in Early Childhood (REEaCh Centre) at the University of Melbourne in Australia. These partnerships strengthened the quality and credibility of the research and supported capacity building, while creating effective channels for engagement beyond academia.

The findings have been systematically shared with non-academic audiences through national-level professional and policy-oriented forums involving representatives from the Ministry of Education, the National Institute for Early Childhood Education, UNICEF, national experts in ECEC, and practitioners and leaders

from kindergarten settings. This has ensured that our research reaches those directly involved in policy development, quality assurance, and implementation.

To support uptake at scale, the findings were translated into accessible, practice-oriented outputs including policy briefs and educator guidelines in [Kazakh](#), [English](#), and [Russian](#), that provided concrete recommendations for classroom practice, kindergarten leadership, and policy design, enabling educators to embed well-being into everyday routines.

Senior representatives from national education authorities and ECEC institutions explicitly confirmed the policy relevance of the research. The findings were recognized as providing a robust evidence base to support improvements in ECEC quality and were identified as suitable for use in both policy development and practical guidance.

Commitments have been made to integrate the research insights into legislative documents and professional resources, supporting ongoing reforms in early childhood education, positioning the project’s impact to deepen over time as these reforms progress and strengthen the holistic development, health, and well-being of young children in Kazakhstan.



2ND NU SEDS ANNUAL RESEARCH CONFERENCE

“TRANSFORMING THE FUTURE OF ENGINEERING AND DIGITAL SCIENCES RESEARCH IN CENTRAL ASIA”

APRIL 9-10, 2026



As a part of Nazarbayev University's 15th year celebration, School of Engineering and Digital Sciences (SEDS) hosted the 2nd NU Research Conference on April 9–10. The conference Theme “Transforming the Future of Engineering and Digital Sciences Research in Central Asia,” emphasized the collaborative spirit that fosters research, creativity, and advancement.

This multidisciplinary two days Conference co-organized with Women in Engineering Club offered insightful plenary sessions from distinguished speakers, enlightening debate by global and local experts, industry engagement, poster exhibition, 7MR competition, SEDS research excellence awards, workshops and talks by esteemed researchers.

KEYNOTE SPEAKERS

The Keynote Session of the 2nd SEDS Annual Research Conference 2026 featured distinguished speakers, each dedicated to one of our five core research priorities. The speakers represented institutions from Clausthal University of Technology, Michigan State University, Pennsylvania State University, Cranfield University, University of Warwick, Southeast University, and Northwestern Polytechnical University. The conference successfully featured distinguished keynote speakers whose insights highlighted the crucial need for academic excellence, further reinforcing a robust commitment of NU to global high impact research.



RESEARCH POSTER EXHIBITION

The research poster exhibition session of the 2nd SEDS Annual Research Conference 2026 achieved record-breaking participation highlighting increased institutional diversity. More than a hundred posters were submitted by participants representing 12 universities from cities across Kazakhstan, highlighting the breadth of research activity in the country.

Aligning with modern environmental standards, this year's session transitioned to a sustainable digital format. By utilizing large-scale electronic displays instead of traditional printed media, the conference significantly reduced its ecological footprint while fostering a dynamic and technologically advanced environment. This successful session underscored a robust commitment to interdisciplinary excellence and growing global research collaboration.

INDUSTRY-BASED PANEL ENGAGEMENT

The conference hosted 7 dynamic panel discussions on Industry Engagement. Targeted panel sessions sparked powerful conversations on how NU can bridge research excellence with real-world impact across Central Asia and beyond.

The panel session welcomed more than 30 panelists from leading industries including China State Construction Engineering Corporation, China Energy Engineering Corporation, Beijing Urban Construction Design and Development Group, Samruk-Kazyna Ondeu LLP, National Center for Children's Rehabilitation, Airbus Helicopters Kazakhstan, UNDP and others.

KEY HIGHLIGHTS FROM THE PANELS:

- Strengthening university – industry partnerships for translational research
- Commercialization pathways for engineering and digital innovations
- Industry – aligned curriculum design and talent development
- AI, cybersecurity, and emerging technologies in industrial deployment
- Startup ecosystems and venture collaboration
- Public – private research funding models
- Building sustainable innovation pipelines in the region
- The discussions were insightful, candid, and forward-looking – emphasizing collaboration, trust, and long-term ecosystem building.



NU IMPACT FOUNDATION

This session hosted faculty innovators to discuss how university research can evolve into real-world technologies and entrepreneurial opportunities. The participants shared their experience and expertise on translating scientific discoveries into impactful innovations critical for society and industry. The discussions explored how universities can empower faculty and students to move beyond traditional research outcomes and actively participate in shaping the future innovation ecosystem. The panel highlighted perspectives identifying commercialization potential in research, the role of the university in supporting innovation and technology transfer, protecting intellectual property while maintaining academic publication goals, building interdisciplinary teams that bridge science, engineering, and business, and preparing the next generation of researchers to create both knowledge and real-world impact.



5. 7-MINUTE RESEARCH (7MR) COMPETITION: INSPIRING RESEARCH, EMPOWERING MINDS, SHAPING SOCIETAL IMPACT

The 7-Minute Research (7MR) competition was another milestone of the conference, which was held for the first time at Nazarbayev University. The idea behind the concept is to allow graduate and undergraduate students to showcase their research in 7 minutes. This event aims to enhance research communication skills among university students, evaluate the societal impact of scholarly work, and promote research culture in Kazakhstan and beyond.

In the first edition, 60 students from over 10 different universities of Kazakhstan participated. The finale which was held on April 10, 2026 was evaluated by NU and international experts from the University of Michigan and Clausthal University of Technology.



MEET OUR WINNERS:

Winner: Riya Bhat, South Kazakhstan Medical Academy

Runner-Up: Botagoz Akhmetzhanova, Nazarbayev University

People's Choice Award: Muhammad Awais Jamali, Nazarbayev University

Best Societal Impact: Kamila Bissenbayeva, Nazarbayev University

Best Undergraduate Researcher: Riya Bhat, South Kazakhstan Medical Academy

6. WORKSHOP

The Workshop session by Prof. Gulsim Kulsharova highlighted designing publishable papers, addressing PhD students, postdoctoral researchers and early-career academics. The session improved our capacity to use structured strategies to prepare manuscripts for high impact journals.

[Read More](#)



NU ANNUAL RESEARCH CONFERENCE 2026 THE INTERNATIONAL SCIENTIFIC-THEORETICAL CONFERENCE "SOCIAL SCIENCES AND HUMANITIES: A DISCOURSE OF PUBLIC VALUES."



OVERVIEW

Nazarbayev University hosted the II International Scientific and Theoretical Conference, "Social Sciences and Humanities: A Discourse of Public Values," which brought together scholars to examine post-colonialism, identity, and the transformation of social values in Kazakhstan and other countries that gained independence after 1991. The event was organized by NU's Department of Kazakh Language and Turkic Studies on March 20, 2026.

The conference opened with remarks by Vice President Kadisha Dairova, Dean of the School of Sciences and Humanities, Gonzalo Hortelano, and Professor Uli Schamiloglu, chair of the Department of Kazakh Language and Turkic Studies.

Professor Schamiloglu emphasized that postcolonial discourse remains an important analytical framework for the academic community, noting a growing inter-





THE CONFERENCE AIMED TO:

- Continue the Department's commitment to promoting the best critical research and professional development. It seeks to foster professional growth and exchange leading international theories with colleagues in Kazakhstan.
- Provide a unique national platform for Kazakhstani scholars to familiarize themselves with post-colonial theory and facilitate intellectual dialogue connecting global theory with local contexts;
- Support NU's mission to promote research on public values, identity, and research on post-colonialism in contemporary societies.



Inspiring Research Empowering Minds, Shaping Societal Impact



<p>Winner and the Best Undergraduate Researcher RIYA BHAT DEPARTMENT OF GENERAL PRACTITIONER AND DERMATOVENEROLOGY SOUTH KAZAKHSTAN MEDICAL ACADEMY Multimodal Digital Biomarkers for Early diagnosis of neurodegenerative diseases</p> 	<p>Runner-Up BOTAGOZ AKHMETZHANOVA DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING SCHOOL OF ENGINEERING AND DIGITAL SCIENCES NAZARBAYEV UNIVERSITY A novel IoT-PCM framework for building-based thermal regulation</p> 
<p>Best Societal Impact KAMILA BISSENBAYEVA DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING SCHOOL OF ENGINEERING AND DIGITAL SCIENCES NAZARBAYEV UNIVERSITY Real-Time monitoring of soil-water characteristic curves in rooted soils using high-suction polymer sensors and big data integration</p> 	<p>People's Choice Award MUHAMMAD AWAIS JAMALI DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING SCHOOL OF ENGINEERING AND DIGITAL SCIENCES NAZARBAYEV UNIVERSITY Advanced Biowaste-derived hard carbon anodes for Sodium-Ion batteries</p> 

est among students in this area of research. “This is a highly important topic for Kazakhstan, as it enables students to analyze their own culture through contemporary conceptual frameworks that are widely used to study other regions of the world but not very well known for this part of the world,” he said.

KEYNOTE SPEAKERS

Professor Anna Oldfield of Coastal Carolina University was one of the keynote speakers. She said: “At the same time, new generations of Western scholars are studying the Kazakh language, literature, and history, working side by side with you to better understand local lives and intellectual traditions.” Keynote speakers also included Dr. Rosa E. Wellman of the University of Michigan–Dearborn, the USA and Associate Professor Ainash Mustoyapova of Buketov University, Kazakhstan.

A BOOK EXHIBITION

During the conference, a book exhibition featured domestic and international titles on postcolonialism and decolonization, as well as works by faculty members of the Department of Kazakh Language and Turkic Studies at NU.

PARTICIPATION AND REACH

The conference featured more than 50 presentations across disciplines, including linguistics, literary studies, Turkic studies, and anthropology. How the discourse of social values is reflected in the social and humanitarian sciences was a central theme of the conference. Questions such as which values are important in society, what we most celebrate, how they were formed, and the reasons for their spread or change constituted the main analytical focus. This discourse was examined from multiple angles across the conference’s sessions in different scientific directions:

In the session on Linguistic Aspects of Postcolonial Discourse, language was analyzed not merely as a means of communication but as a force shaping values, the linguistic and cultural reflection of answers to questions such as “What is right?”, “What is important?” “Who/what should be like what?”, and “How did it come about?” – explored through the following directions:

- The linguistic manifestation of terminological policy in academic discourse
- The shift of donor language in Kazakh academic discourse
- The conceptual-terminological field of postcolonial discourse, and more.

The session on Literary Studies was rich in topics. Prose and poetry in Kazakh and foreign languages, academic research, and shared ideas and motifs in the works of well-known authors were compared,

identified, and distinguished. Studies were conducted based on F. Fanon’s theory, comparisons with the works of Elif Shafak and Chinua Achebe, and the philosophy of Emmanuel Levinas.

The session on Turkic Studies: Cultural and Historical Continuity served as a multilingual, multidirectional academic platform. Topics discussed included the decolonization of the Uzbek language; the concepts of “Homeland” and “Enemy” in the discourse of hatred in Russia; an analysis of Kazakhstan’s postcolonial linguistic space through the ideas of Frantz Fanon; a sociological analysis of metadata related to language teaching; and national animation discourse.

The session on Historical, Anthropological, and Philosophical Foundations of Social Values examined the discourses of the dominant value system in contemporary post-Soviet Kazakh society as reflected in language, text, and communication.

The conference was attended by scholars from the USA, Europe, Uzbekistan, and China, as well as researchers from Kazakhstani higher education institutions, including: Karaganda National Research University named after E.A. Buketov, Aktobe Regional University named after K. Zhubanov, Kazakh National Pedagogical University named after Abai, Nur-Mubarak Egyptian University of Islamic Culture, Eurasian National University named after L.N. Gumilyov, the Institute of Linguistics named after A. Baitursynov, Kazakh National University named after Al-Farabi, Turan-Astana University, the Institute of Literature and Art named after M.O. Auezov, Toraighyrov University JSC, SDU University, Kazakh National Agrarian Research University, South Kazakhstan University named after M. Auezov, the Institute of State History under the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan, Kazakh University of International Relations and World Languages named after Ablai Khan, Khoja Akhmet Yassawi International Kazakh-Turkish University, and Zhangir Khan West Kazakhstan University.

THE SEMINAR WAS CONDUCTED

One of the conference’s goals was to facilitate the exchange of experience in leading international theories with Kazakhstani colleagues to encourage the professional development of researchers. In this direction, Professor Anna Oldfield (Coastal Carolina University, USA) conducted a seminar titled “Teaching Literature and Writing in the Age of Artificial Intelligence.”

GOALS FOR THE FUTURE

The goals of providing a platform for Kazakhstani scholars to develop an intellectual dialogue connecting international theories with the local context, serving as an open discussion space for this purpose, and supporting NU’s mission to advance research in collaboration with foreign scientists – these will continue to be the objectives of the scientific conference in the years ahead.

INNOVATION & ENTREPRENEURSHIP

DeepTech Bäige Finals at Nazarbayev University Spotlight Kazakhstan’s Science-Driven Startups



With a prize fund of 16 million tenge, the competition brought together emerging deep-tech teams working across AI, biotechnology, hardware, energy, medicine, robotics, agrotech and sustainable technologies.

The final of the **DeepTech Bäige competition** was held at **Nazarbayev University’s Önergy Creative Hub** on April 30, 2026, marking one of Kazakhstan’s key events dedicated to supporting science-intensive startups and advancing future technologies.

Organized by **NURIS – Astana Business Campus** with the support of the **NU Impact Foundation**, part of the Nazarbayev University ecosystem, the competition brought together promising teams developing solutions in artificial intelligence, hardware, biotechnology, energy, medicine, robotics, agrotechnology and other deep-tech areas.

This year, DeepTech Bäige attracted strong interest from across the country, receiving around **200 applications from all regions of Kazakhstan**. Following a multi-stage selection process, **11 finalist projects** advanced to the final round, where they presented their solutions to the jury, investors, business representatives and members of the technology community.

The final gathered representatives of the public sector, international technology community, business, investment groups, experts and participants of Ka-

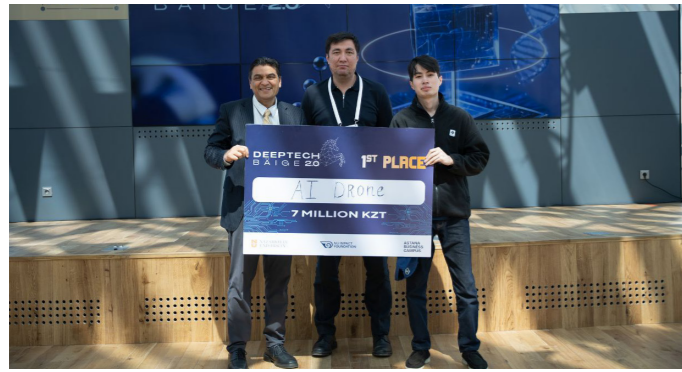
zakhstan’s innovation ecosystem. The event opened with a welcome address by **Sayasat Nurbek, Minister of Science and Higher Education of the Republic of Kazakhstan**, who emphasized the importance of supporting science-intensive projects, strengthening research capacity, advancing technological entrepreneurship and creating conditions for young teams capable of developing solutions for the future.

Participants were also welcomed by **Nico Caprez, Vice President, Global AI Infrastructure Growth at NVIDIA**, who spoke about NVIDIA’s work and its role in advancing artificial intelligence, accelerated computing and global AI infrastructure. His participation highlighted the importance of international expertise, global partnerships and advanced technological solutions for the development of deep-tech fields in Kazakhstan.

DeepTech Bäige became a platform where science, technology and entrepreneurship came together around a shared goal: supporting projects with the potential to move beyond ideas and become real products for the market. Finalists presented solutions in autonomous systems, biomedicine, energy, digital infrastructure, artificial intelligence, agriculture and sustainable technologies.

The total prize fund of the competition amounted to **16,000,000 tenge**, provided with the support of the NU Impact Foundation.

WINNERS OF DEEPTECH BÄIGE 2026



1st place – AI DRONE
Prize: 7,000,000 tenge

AI DRONE presented an autonomous unmanned aerial vehicle powered by LLM-based control, demonstrating how language models can expand the capabilities of robotic systems.

2nd place – ROBIO



Prize: 5,000,000 tenge

ROBIO is developing an AI-powered tactile glove for biomedical screening, transforming tactile data into a tool for diagnostics and medical analysis.

3rd place – BUNKSENSE



Prize: 3,000,000 tenge

BUNKSENSE introduced an autonomous AI-based feeding monitoring system for feedlots, designed to improve monitoring accuracy, reduce losses and enhance operational efficiency.

Audience Choice Award – From Earth to Orbit



Prize: 1,000,000 tenge

From Earth to Orbit received the Audience Choice Award for its Kazakhstan-developed battery technologies for sustainable energy and the aerospace sector.



FROM THE MICROCOSM TO THE COSMOS: INSIDE KAZAKHSTAN'S 2025 WIKI SCIENCE COMPETITION



ID Bibigul Makazhanova, Senior Communications Coordinator, NURA

The national stage of the international Wiki Science Competition, organised by Nazarbayev University Research Administration, drew 517 entries — and turned the often-invisible work of Kazakhstani scientists into images the whole world can use.



Say the word “science” and most of us picture dense formulas and quiet, repetitive hours behind laboratory doors. Yet science also holds a beauty we rarely stop to notice — in the structure of a single cell, in a satellite’s split-second flight across the Moon, in the dust of a receded sea. The 2025 **Wiki Science Competition (WSC)** set out to make that beauty visible.

The national stage of this international contest has now concluded in Kazakhstan, organised by **Nazarbayev University Research Administration (NURA)**. This year it brought together not only researchers but also travellers and naturalists, gathering 517 submissions from every corner of the country. The strongest national entries advance to the international stage of the competition in February 2026.

“The competition gives scientists a chance to show the projects they are working on — and to show that science can be not only meaningful but also visually beautiful.”

— Bibigul Makazhanova, Senior Communications Coordinator, NURA

A CONTEST BUILT ON OPEN KNOWLEDGE

The Wiki Science Competition is the largest international contest of scientific photography and video, run by the Wikipedia community. Every entry is published on **Wikimedia Commons** under an open license, which makes the im-

ages freely available for education and science communication worldwide. For Kazakhstan, this means each submitted work also enriches Wikipedia’s global knowledge base and strengthens the international visibility of the country’s research — a small but real contribution to how the world sees, and uses, science from Central Asia.

This year’s works were spread across seven categories: Wildlife & Nature (149 entries), Microscopic Images (139), People in Science (85), the General category (55), Astronomy (50), Image Sets (26), and Non-photographic Media (17).

CAN YOU PHOTOGRAPH PRESSURE?

So much of the scientific world sits just beyond the reach of the human eye. In Nazarbayev University’s Tactile Robotics Lab, researcher **Dimash Mukashev** photographed a robotic hand gripping a small transparent sphere. At first glance there is nothing remarkable in the frame — a mechanical hand holding what looks like an ordinary piece of plastic.

But the moment Mukashev placed a polarising filter in front of the lens — letting through only light vibrating in a single direction — something otherwise invisible appeared. As the robot’s grip tightened, intricate, shifting bands of light began to play across the sphere’s surface. In an instant, plain physical pressure became a visible image.



PHOTO · General category — “Sense of Light” by Dimash Mukashev
Source / credit: https://commons.wikimedia.org/wiki/File:Sense_of_Light.jpg

“The essence of photoelasticity is that the light-refracting properties of any object change when force is applied to it,” the researcher explained. “We are developing sensors that let robots understand and reproduce the human sense of touch — something we take completely for granted in everyday life, yet which even the most advanced technology still cannot fully replicate.”

Mukashev named the work **Sense of Light**. The shot, he said, turned out far too beautiful to bury in a dry research paper — and the competition offered the perfect chance to show a wider public how technology is learning to capture the dexterity of the human hand. The image won the **General category**.

SECRETS OF THE MICRO-WORLD

Science’s real treasures are never on the surface. Hemmed in by the narrow circle our eyes are used to, we rarely register the deep ecological processes and hidden phenomena of the micro-world — as if everything ended at the horizon we

can see. For the WSC winners, photography became the key to breaking through that boundary. Their frames are not luck; they are the product of painstaking labour, complex calculation, and hours of patient waiting that turn the invisible into hard evidence.

Take the very air we breathe. Astana is a windy city, so its air can seem clean — but the reality is otherwise. Researcher Akmaral Agibayeva and her team spent two years collecting samples to document exactly what residents are breathing. High-resolution micrographs revealed the true face of the problem: sharp, rough particles of many sizes, formed by vehicle exhaust, burned coal, and urban dust — a vivid reminder of an invisible threat to health, especially in winter.

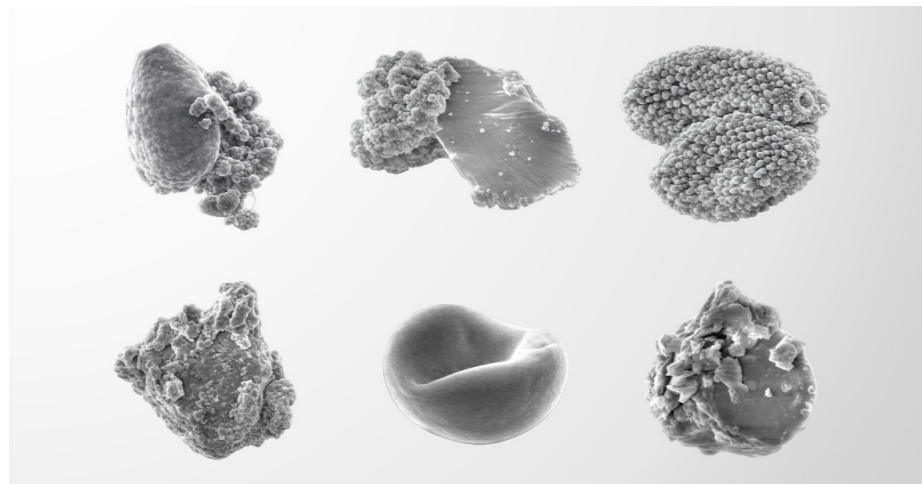


IMAGE SET · Image Sets — “The Air We Breathe: A Microscopic View of Urban Air” by Akmaral Agibayeva
Source / credit: https://commons.wikimedia.org/wiki/File:A_Microscopic_View_of_Urban_Air.png

Scientifically, the set offers rare morphological evidence of PM2.5 and PM2.5–10 particles in the region, shows how pollution sources differ by season, and helps establish a baseline for future air-quality research across Central Asia. The work won the Image Sets category.

Equal precision shaped the winning entry by **Nurgul Daniyeva**, who used a powerful Auriga Crossbeam 540 scanning electron microscope at NU’s Core Facilities to image *Escherichia coli* at 25,000× magnification.



PHOTO · Microscopic Images — “E. coli bacteria at ×25,000” by Nurgul Daniyeva
Source / credit: [https://commons.wikimedia.org/wiki/File:E-coli_\(Escherichia_coli\).jpg](https://commons.wikimedia.org/wiki/File:E-coli_(Escherichia_coli).jpg)

“Working with biological samples demands rigorous control and a great deal of experience,” Daniyeva said. “It is essential to keep them as natural and viable as possible — even a tiny error in preparation can distort or destroy the structure of the specimen. Here, every small detail matters.” For her, the image is a tribute to a cornerstone of molecular biology that

scientists everywhere rely on but rarely see this closely. “We don’t usually imagine bacteria as beautiful, but the view under the microscope is something else entirely. Going deep into the micro-world reveals astonishing sights — at a certain point it captivates you so completely that you lose all track of time.” The photograph took the **Microscopic Images** category.

DEBUNKING A MYTH: AN AURORA AT THE 50TH PARALLEL

Just how demanding scientific photography can be is best seen in the work of **Evgeniy Bondar**, who won an extraordinary three of the seven categories. Among his most striking entries is a timelapse of the northern lights captured at Kazakhstan’s central latitudes — the winner in **Non-photographic Media**.



VIDEO · Non-photographic Media — “Aurora Borealis in the Steppes of Kazakhstan” by Evgeniy Bondar
In print: place a representative still frame here. Scan the QR code to watch the original video on Wikimedia Commons.



“Photographing an aurora at our latitude was a dream of mine for five years,” Bondar said. “Studying the scientific literature, I came to understand that while the phenomenon is rare here, it is entirely possible.” He is quick to debunk a popular myth that auroras now appear over Kazakhstan because of climate change. The real reason, he argues, lies in the rapid advance of camera technology. An aurora at 50° north is extremely faint, and the human eye often cannot detect it at all; during the powerful magnetic storms of the 19th century, people simply lacked today’s hyper-sensitive cameras — and social media to share what they saw.

“Today we have instruments that reveal the invisible,” he explained. “This frame, shot in the Oshagandy gorge, is the result of patient waiting and persistent study of the solar cycles. This natural wonder has always been there. We have only just gained the ability to see it.” The footage, captured during the powerful G4 geomagnetic storm of 10 October 2024, records the shift from green to an intense, high-altitude red.

WORTH THE WAIT: PRECISION AND PATIENCE

Bondar’s other winning works demanded the same iron patience. His photograph of the Karynzhyryk Hollow in Mangystau — winner of the **Wildlife & Nature** category — was ten years in the planning. To capture the dawn light and the perfect symmetry of the “Three Brothers” (Ush Agai) reflected in a mirror-flat salt flat, he travelled deep into a remote, harshly beautiful region.



PHOTO · Wildlife & Nature — “The ‘Three Brothers’ mountain in the Karynzhyryk tract” by Evgeniy Bondar
Source / credit: https://commons.wikimedia.org/wiki/File:Karynzhyryk_tract_Kazakhstan_Mangystau_November_2024.jpg

The landscape is itself a relic of deep time: the preserved floor of the ancient Tethys Ocean, uplifted by tectonic forces and sculpted over millions of years by wind and water, its layers of chalk, marl, and limestone marking successive marine environments. That morning, thick cloud, the first rays of sun, and the glassy surface of the saline sor all fell into alignment at once.

If the Karynzhyryk shot required a long expedition, Bondar’s image of the International Space Station crossing the face of the Moon — winner of the **Astronomy** category — required flawless calculation.

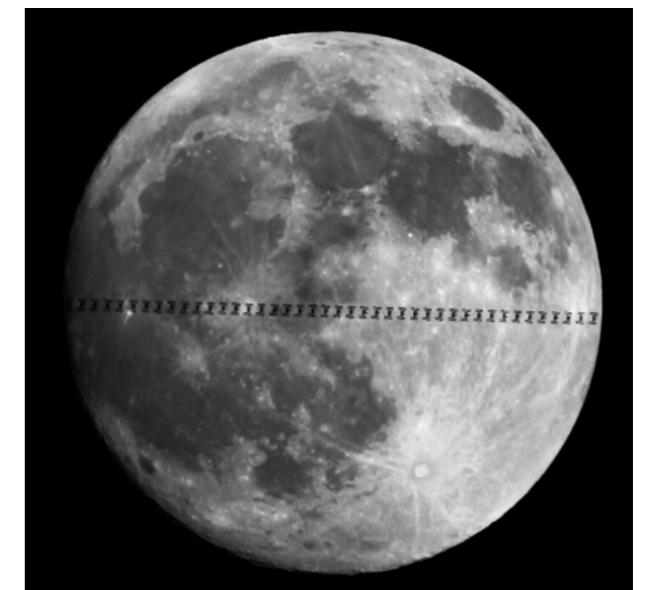


PHOTO · Astronomy — “Transit of the ISS Across the Lunar Disk” by Evgeniy Bondar
Source / credit: https://commons.wikimedia.org/wiki/File:ISS_tranzit3.png

“From the outside it looks simple, but the preparation is extremely complex,” Bondar said. Even with specialised software, planning the frame took half a year: at times the Moon’s phase was wrong, at others the ideal vantage point lay too far away, or cloud cover ruined the attempt. Final-

ly, on the frosty night of 10 January 2021, he drove to a small village near Karaganda, set up his equipment, and waited for a moment that would last exactly 1.54 seconds. The transit was so fast that he saw nothing on the camera's small screen and drove home convinced he had failed — only to discover, analysing the high-speed video frame by frame, the unmistakable silhouette of the station slicing across the lunar disk, its solar arrays and modules just visible. In astrophotography, he notes, the most remarkable images often hide inside the raw data, waiting for their moment.

SCIENCE BEYOND THE LAB

The lens of scientific photography turns not only to the micro-world and the cosmos, but also to the environmental consequences of human activity. On 2 March 2024, on the salt-crusted bed of the Aral Sea, photographer **Igor Ulitin** captured ecologist **Maria Zadneprovskaya** at work. Standing on the desiccated seabed, she and a local forester plant seedlings of saxaul (Haloxylon) — the one species hardy enough to anchor the toxic, saline sand and slow the dust storms that



now plague the region.

PHOTO · People in Science — “Scientist Maria Zadneprovskaya plants saxaul on the dry bed of the Aral Sea” by Igor Ulitin
Source / credit: https://commons.wikimedia.org/wiki/File:Scientist_Maria_Zadneprovskaya_participates_in_planting_saxaul_on_the_dry_bed_of_the_Aral_Sea.jpg

The frame was made during a project led by AlmaU together with the International Fund for Saving the Aral Sea, where Zadneprovskaya guided volunteers on how to plant saxaul so that it takes root in the soil of the Aralkum. “I chose this photograph to show that the work of scientists is not confined to comfortable offices and laboratories,” Ulitin said. “This is real fieldwork — in deserts, mountains, forests, and other harsh environments.” The image won the People in Science category.

HOW THE WINNERS WERE CHOSEN

For these fleeting moments to become public knowledge, an independent jury — drawn from the scientific and creative communities, civil society, and the media — assessed the works not only on visual quality but also on scientific relevance, clarity and completeness of description, originality, and expert judgement. Judging ran in three stages: each juror first shortlisted three works per category, the panel then narrowed these to two top works per category, and a final

discussion and vote determined the winners.

The competition has two levels. At the national level, one winner was selected in each of the seven categories; these winners receive the cash prizes and go forward to represent Kazakhstan. In addition, a number of strong shortlisted works were forwarded to the international round as finalists, where they will be assessed by the global WSC jury alongside the winners. On the competition's Wikimedia Commons page, the two groups are listed separately — winners and finalists.

Jury member **Alexandr Arbuz**, a researcher at NU's Office of Research Core Facilities and HPC, was struck by the sheer range of techniques on display — from electron, confocal, and classical microscopy to artistic scientific photography — and admitted that choosing between so many strong works was far from easy. International WSC juror **José Berengueres** said the contest reveals science as a space not only for discovery but also for an artistic eye and genuine inspiration.

A DECADE OF SCIENCE COMMUNICATION

The Kazakhstan stage was coordinated by **Bibigul Makazhanova**, Senior Communications Coordinator at NURA, who has now led both national editions of the competition — in 2015 and again in 2025. Coordinating the contest a decade apart, she has helped turn a one-off event into a recurring platform for visual science communication in Kazakhstan, connecting researchers, photographers, and the wider public around a single idea: that science is worth looking at closely.

Makazhanova notes that at a time when the line between human-made and AI-generated imagery is increasingly blurred, the contest underscores the enduring value of human observation, the professional eye, and research intuition.

PARTNERS, SUPPORT, AND WHAT COMES NEXT

In 2025 the Kazakhstan stage was organised by NURA with sponsorship from the NU Impact Foundation, in partnership with **ÓNERGY Creative Art Hub and DC Lab (Digital Creativity Lab)**.

The Association for the Conservation of Biodiversity of Kazakhstan (ACBK) did not let the competition pass it by either, singling out three works for special recognition: a frog photographed after the rain (by Saigyozen), the Red-listed nodding tulip in bloom on campus (by MarzhanNurlankyzy), and grey partridges on a snowy hill in Astana (by Vadimure). Their authors will receive ACBK's own special editions as a gift.

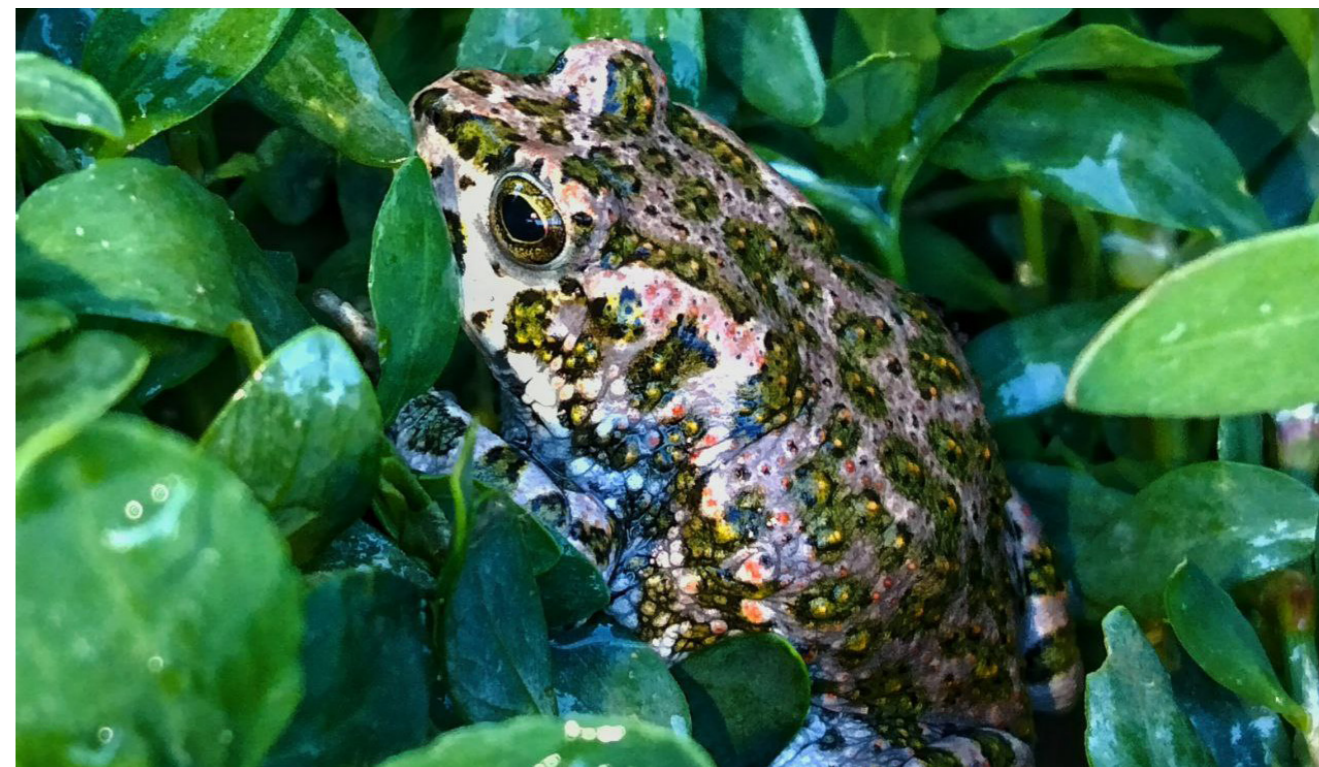


PHOTO · ACBK special mention — “A frog after the rain” by Saigyozen



PHOTO · ACBK special mention — “Grey partridges, Astana” by Vadimure

An award ceremony in June will see the winners in all seven categories receive a cash prize of **200,000 tenge**. Selected works will also be presented in an art exhibition at the ÓNERGY Creative Art Hub during 2026, bringing scientific photography to a far broader audience — while Kazakhstan's strongest entries go on to represent the country at the international stage of the Wiki Science Competition.

The participants of this year's contest prove a quiet but important truth: to grasp the depth of the world, it is not enough simply to hold a camera and be in the right place. True scientific photography is research insight, exact calculation, and the rare skill of seeing the extraordinary exactly where no one else thinks to look.



PHOTO · ACBK special mention — “Spring on campus, a wild (nodding) tulip” by MarzhanNurlankyzy

SOURCES & ACKNOWLEDGEMENTS

The winners' quotes in this article are drawn from the feature published by **National Geographic Qazaqstan**. With thanks to the NU Press Office for the interviews. Scan the QR code below to read the original article. [Read More](#)



BREATH OF THE RIVER IN THE FROST

A bird crosses the mist above a freezing river. Author — TBC · Wikimedia Commons



WILDLIFE & NATURE



Akzhar Chalk Mountains

Painted badlands, Kostanay region, Sept 2024 · Author — TBC · Wikimedia Commons

WIKI SCIENCE COMPETITION 2025 · KAZAKHSTAN

Wildlife & Nature

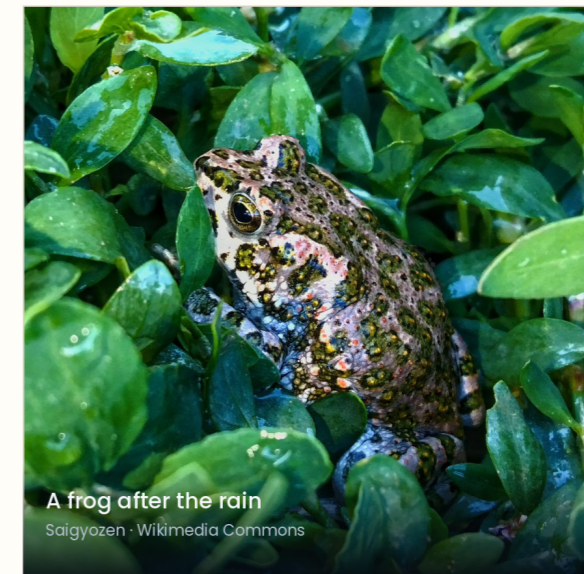
SHORTLIST · 5 FINALISTS

Category winners are featured in the main article.



Mushroom in moss

Pine forest, Burabay · TBC · Commons



A frog after the rain

Saigyozen · Wikimedia Commons



Kingfisher

Alcedo atthis · TBC

People in Science

SHORTLIST · 3 FINALISTS

Category winners are featured in the main article.



Excavation after dark

Field archaeology by headlamp · Author — TBC · Wikimedia Commons

01 — 03 · SHORTLISTED WORKS

People at work in the field, the lab and the science festival.



Trek to the glacier

A research team hauls equipment toward a mountain glacier · Author — TBC · Wikimedia Commons

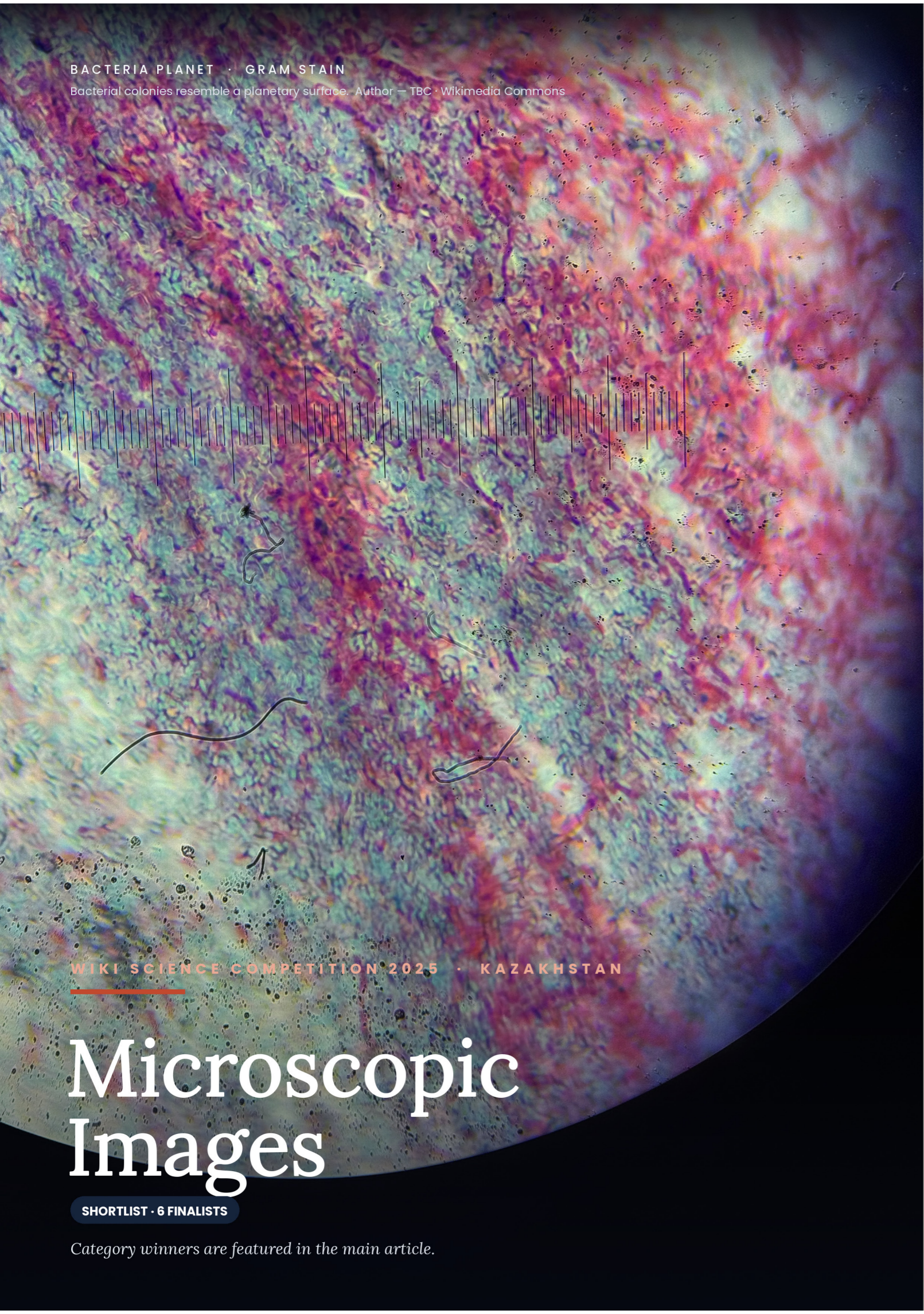


Science from a young age

A young visitor runs her first experiment at a science festival · Author — TBC · Wikimedia Commons

BACTERIA PLANET · GRAM STAIN

Bacterial colonies resemble a planetary surface. Author — TBC · Wikimedia Commons



WIKI SCIENCE COMPETITION 2025 · KAZAKHSTAN

Microscopic Images

SHORTLIST · 6 FINALISTS

Category winners are featured in the main article.

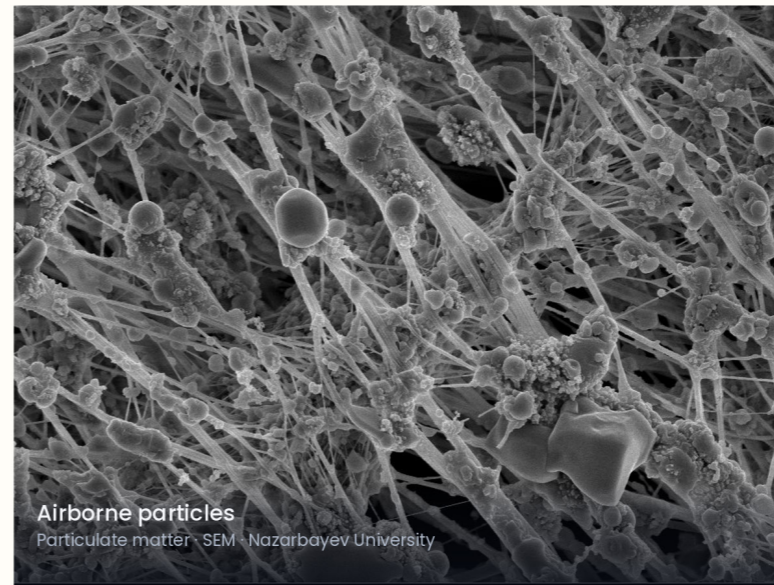
MICROSCOPIC IMAGES



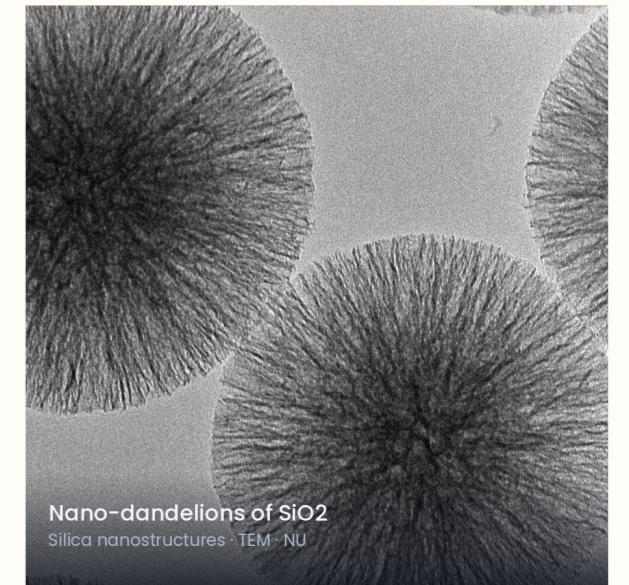
Microflower of ZnO
Zinc-oxide microstructure · SEM ×10,000 · Wikimedia Commons



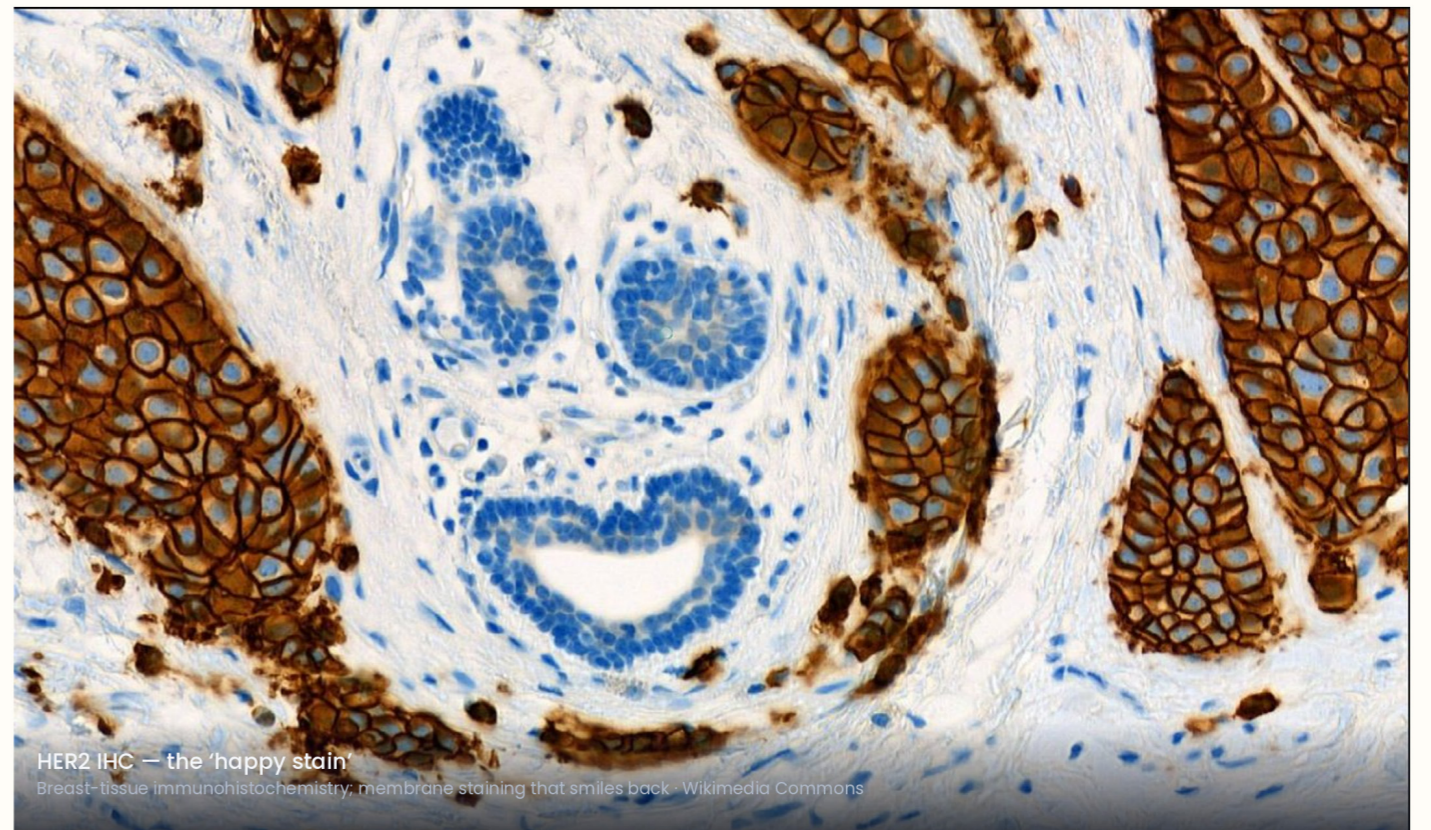
Diatom, Lake Balkhash
Bacillariophyta frustule · SEM · Wikimedia Commons



Airborne particles
Particulate matter · SEM · Nazarbayev University



Nano-dandelions of SiO2
Silica nanostructures · TEM · NU



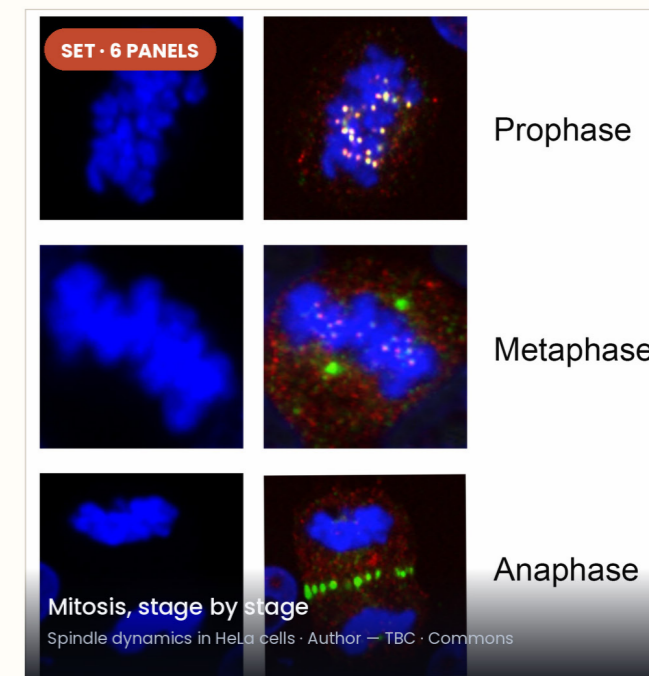
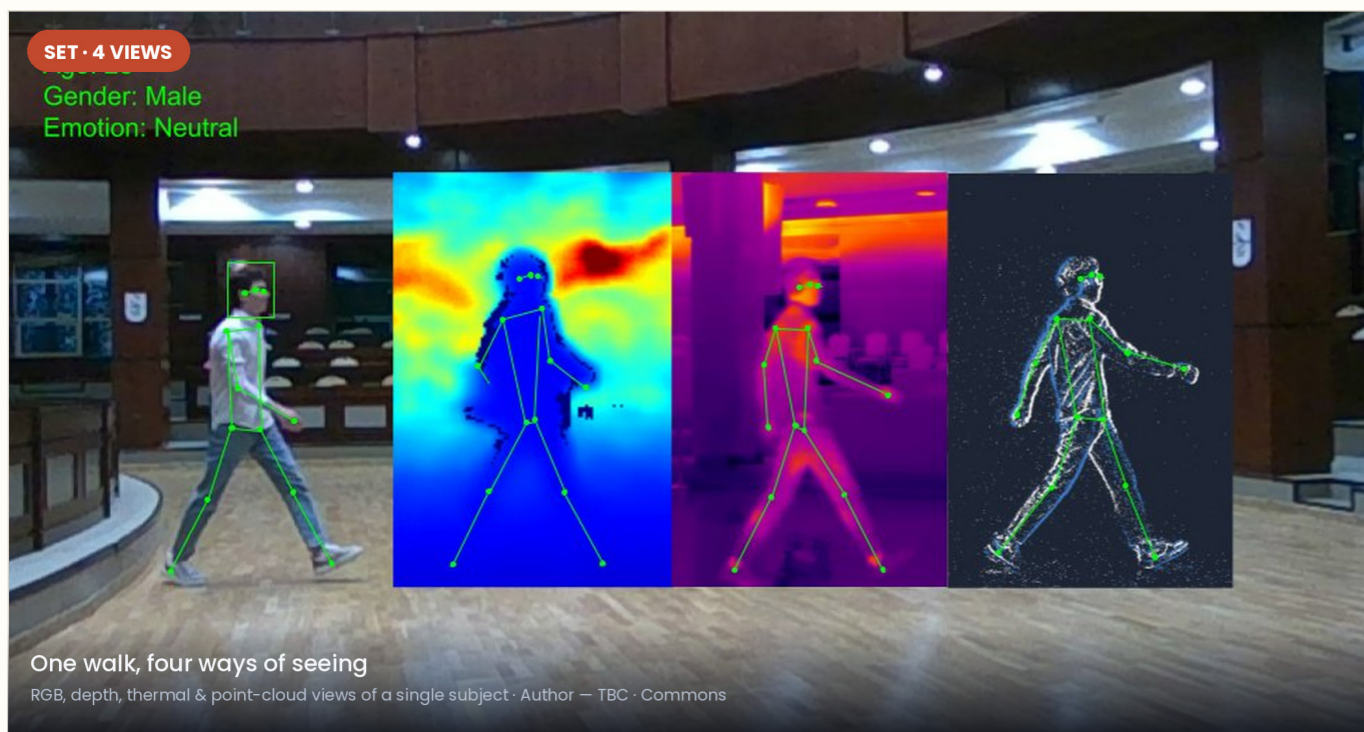
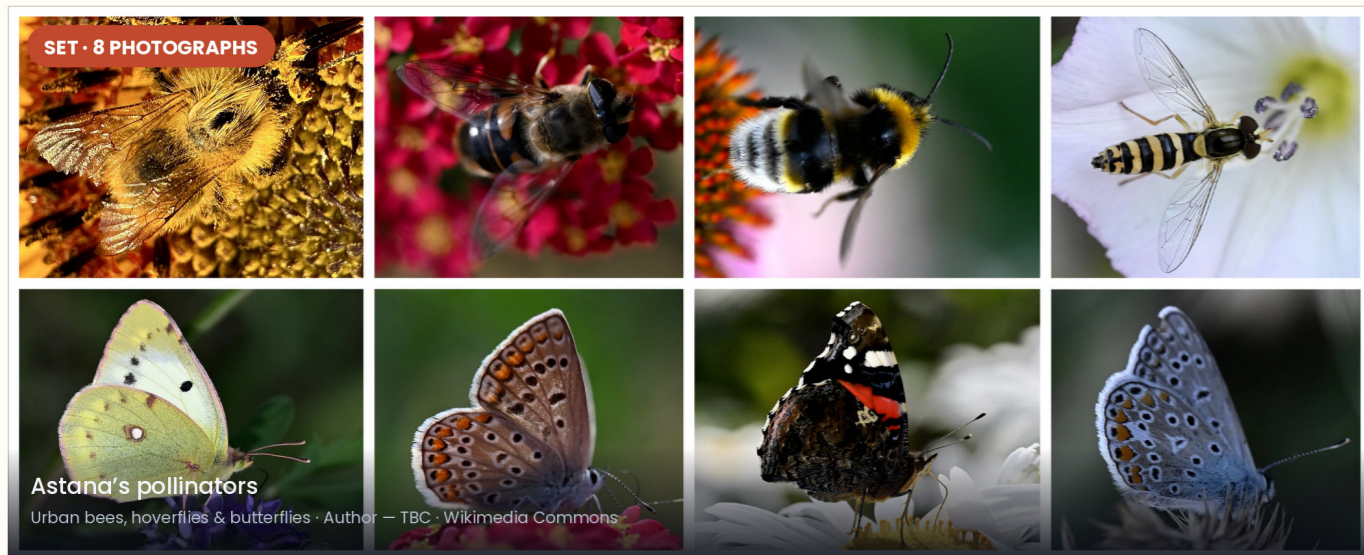
HER2 IHC — the 'happy stain'
Breast-tissue immunohistochemistry; membrane staining that smiles back · Wikimedia Commons

Image Sets

SHORTLIST · 4 FINALISTS

Category winners are featured in the main article.

Each work is a series — several frames read together as one entry.



READING AN IMAGE SET

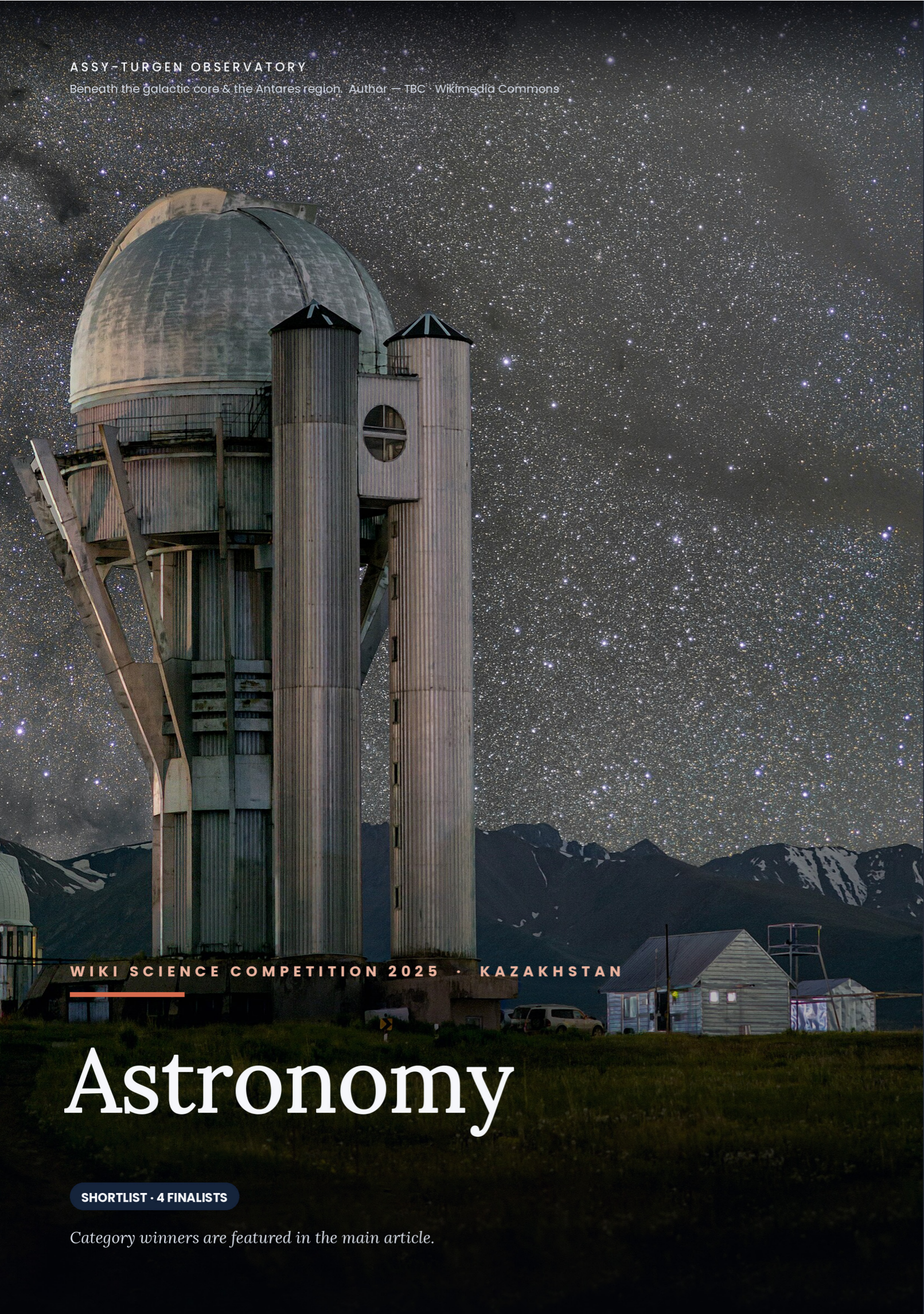
In the Image Sets category a single entry is a series of photographs meant to be seen together — a time sequence, a survey of specimens, or one subject across several methods. The series, not any one frame, is what the jury judges.

- | | |
|---------------------------------|----------------------|
| • Astana's pollinators | 8 photographs |
| • One walk, four ways of seeing | 4 imaging modalities |
| • Anatomy of a pegmatite field | 13 field panels |
| • Mitosis, stage by stage | 6 microscopy panels |

ASSY-TURGEN OBSERVATORY

Beneath the galactic core & the Antares region. Author — TBC · Wikimedia Commons

ASTRONOMY



WIKI SCIENCE COMPETITION 2025 · KAZAKHSTAN

Astronomy

SHORTLIST · 4 FINALISTS

Category winners are featured in the main article.



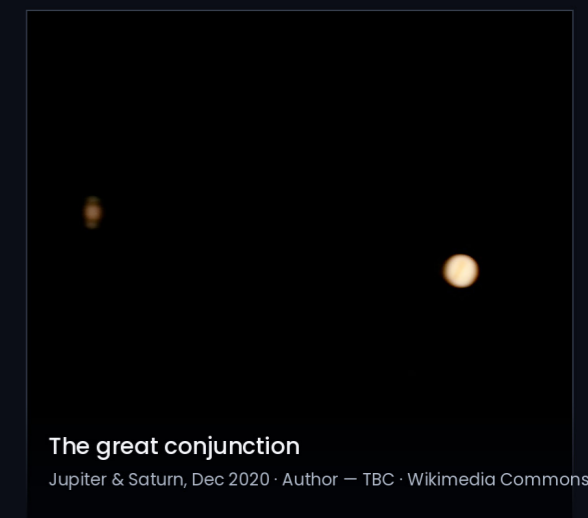
The Milky Way arch over the steppe

A panorama of the galaxy arching above the Kazakh steppe. Author — TBC · Wikimedia Commons



Comet C/2020 F3 (NEOWISE)

Dust and ion tails, July 2020. Author — TBC · Wikimedia Commons



The great conjunction

Jupiter & Saturn, Dec 2020. Author — TBC · Wikimedia Commons

SOYUZ MS-22 · BAIKONUR

A crewed launch climbs into the dusk. Author — TBC · Wikimedia Commons

GENERAL CATEGORY



WIKI SCIENCE COMPETITION 2025 · KAZAKHSTAN

General Category

SHORTLIST · 5 FINALISTS

Category winners are featured in the main article.



Kazakhstan's thunderous apocalypse

Stacked long-exposure of a lightning storm · Author — TBC · Wikimedia Commons



A bolide over the cliff

A bright meteor beneath the Milky Way · Author — TBC · Commons



Beads from a Kangju-period burial

Ancient beads, Turkestan region · Author — TBC · Wikimedia Commons



A frozen soap bubble

Ice crystals bloom in winter · Author — TBC · Commons

ALSO SHORTLISTED · GENERAL CATEGORY

From storm chasing and meteors to archaeology and winter macro — the breadth of the open category.

OPPORTUNITIES & PUBLICATIONS

Research funding calls, academic opportunities and selected publications for the NU community.



NEW RESEARCH PUBLICATIONS

INDEXED IN SCOPUS

Explore Nazarbayev University Research in 2026

Nazarbayev University publications indexed in Scopus in 2026 span a wide range of disciplines, reflecting the diversity and interdisciplinary strength of the University's research community.

For easier navigation, the publications have been grouped into broad disciplinary areas based on the Scopus classification framework.

Explore publications by subject area



Arts and Humanities



Life Sciences



Business and Economics



Medical and Health Sciences



Computer Science



Physical Sciences



Education Studies



Psychology



Engineering



Social Sciences



VIEW THE FULL PUBLICATION LIST

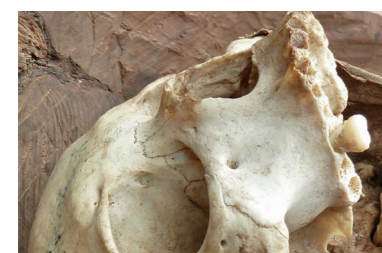
Scan to explore all publications.



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 you. 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
 Office Location: Block C4, 2nd floor, Office 265



ANTHROPOLOGY
Engaged Research Grant
 Deadline: 01/08/2026
 Wenner-Gren Foundation
 More details
\$25,000

Historical Archives Program
 Rolling basis
 Wenner-Gren Foundation
 More details
\$15,000



Focused Ultrasound Foundation Research Awards
 Rolling basis
 Focused Ultrasound Foundation
 More details
\$-not stated

FAST-Trac Award
 Rolling basis
 Foundation for Angelman Syndrome Therapeutics (FAST)
 More details
\$150,000 per year

MEDICINE
Joint IASD/DreamScience™ foundation
 Deadline: 15/10/2026
 The International Association for the Study of Dreams
 More details
\$5,000

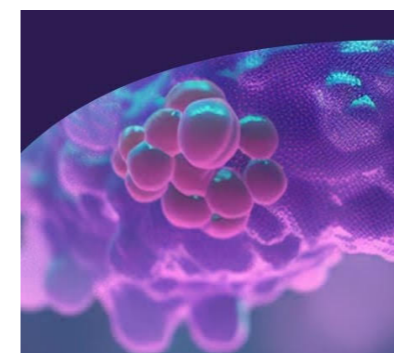
Research and education grants
 Rolling basis
 MedEvac Foundation International
 More details
\$-not stated
New investigator award
 Rolling basis
 Foundation for Angelman Syndrome Therapeutics (FAST)
 More details
\$150,000 per year

Innovation Seed Grant
 Rolling basis
 Foundation for Angelman Syndrome Therapeutics (FAST)
 More details
\$10,000 - \$50,000
Wellcome Early-Career Awards
 Human life, health, and wellbeing
 Wellcome Trust
 More details
up to £400,000

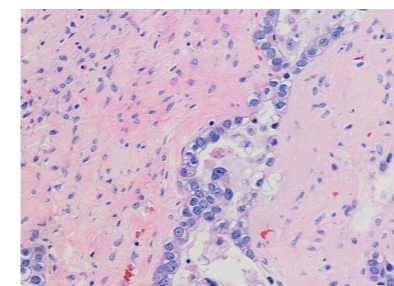


COMPUTER SCIENCE, ENGINEERING
Comcast Innovation Fund
 Rolling basis
 Comcast
 More details
\$3,000 - \$150,000

Internet Freedom Fund
 Rolling basis
 Open Technology Fund (OTF)
 More details
Environmental Sustainability
 Rolling basis
 National Science Foundation
 More details
\$-not stated
Research and development enabling fund
 Rolling basis
 Institution of Civil Engineers (ICE)
 More details
£25,000-£50,000



STEM
Targeted Grants in MPS
 Rolling basis
 Simons Foundation
 More details
\$-not stated
Research Ireland Discover Programme
 – Opportunistic Funding Mechanism
 Rolling basis
 The Science Foundation Ireland
 More details
\$-not stated



ENVIRONMENTAL ENGINEERING AND SUSTAINABILITY
Environmental Sustainability
 Rolling basis
 National Science Foundation
 More details
\$-not stated



GENERAL
FID - Call for Proposals
 Rolling basis
 Fund for Innovation in Development
 More details
€50,000 - €6,250,000
Project Funding
 Rolling basis
 Li Ka Shing Foundation
 More details
\$-not stated

Research Funding
 Rolling basis
 Henry Luce Foundation
 More details
\$-not stated
Research Grants General
 Deadline: 31/08/2026
 Merck KGaA
 More details
€100,000 - €250,000



ECONOMICS PUBLIC POLICY GOVERNANCE CIVIL SOCIETY
Freedom in practice
 Rolling basis
 Rising Tide Foundation (RTF)
 More details
\$-not stated

Pro-active grants
 Rolling basis
 Institute of Chartered Accountants of Scotland (ICAS)
 More details
\$-not stated



Free of Charge

Publish Your Research Open Access

The NU Library, in collaboration with major publishers through the Transformative Agreement (TA), invites NU academics and students to publish their research with Article Processing Charges (APCs) fully covered.



Diamond

Read without charges

Published without charges for authors



Green

Read without charges

Self-archiving using repositories without charges for authors



Gold

Read without charges

Published with charges for authors



Hybrid

Read with charges

Published with charges for authors if no read & publish deals are available

Netherlands Organisation for Scientific Research

Why Publish Open Access?



Increase visibility and global reach



Enhance citation and research impact



Meet funder and institutional requirements

Contact Research Librarians Today!



Email
library@nu.edu.kz



Office
Library 3rd floor, 5E.323



Scan to book a consultation

Schedule your one-on-one appointment online or onsite

BEHIND THIS ISSUE

This issue was prepared by the Editorial Team of Nazarbayev University Research Administration, with contributions from faculty, researchers, laboratories, schools and research support units across the university.

RESEARCH TRANSLATION &
EDITOR

Ainur Zhumasheva

Research Promotion
Senior Coordinator

✉ ainur.zhumasheva@nu.edu.kz

ANALYTICS &
DATA VISUALIZATION

Kalamkas Ayaganova

Data Visualization
Analyst

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



NAZARBAYEV
UNIVERSITY

RESEARCH
ADMINISTRATION

