# MUST SPECIAL EDITION

VOLUME 15

## Bio-Silica Research Takes Center Stage at MUST Workshop

## In this Edition

# EDITOR'S WORD

**Angella Nakato Muyingo**
**Public Relations Officer**
**Office of the Vice Chancellor**

Welcome to this edition of our newsletter, where we bring you the exciting world of bio-silica research! Mbarara University of Science and Technology (MUST) recently hosted a groundbreaking workshop titled "Harmonizing Innovation: Collaborative Synthesis of Bio-Silica Nanoparticles for Industry." This three-day event brought together a vibrant community of researchers, students, and industry leaders, all united by a shared vision: unlocking the immense potential of bio-silica derived from rice husk.

The workshop aligned deeply with MUST's core values of collaboration and innovation. By fostering partnerships with esteemed institutions like Makerere University and Imperial College London, we harnessed the collective expertise needed to explore the vast possibilities of bio-silica.

This revolutionary material holds immense promise for sustainable development. Presentations gave insights of its potential applications in environmental protection, from wastewater treatment to oil spill removal. Additionally, the workshop explored bio-silica's role in enhancing oil recovery, a crucial area for Uganda's economic growth.

The participation of industry representatives like Mr. Aggrey Mugume from the Petroleum Authority of Uganda further underscored the workshop's significance. Building bridges between academia and industry is essential for ensuring research translates into real-world solutions that address Uganda's specific needs.

Beyond the scientific breakthroughs, the workshop fostered a spirit of teamwork. Deputy Vice-Chancellor, Associate Professor Charles Tushabomwe Kazooba's closing remarks deeply, emphasizing the power of collaboration through a compelling story. This spirit of collective action, not just within academia but across sectors, is a cornerstone of what we stand for at MUST.

We at MUST are committed to remaining at the forefront of bio-silica research. The knowledge and connections fostered through this workshop will undoubtedly propel further advancements in this field. We firmly believe that bio-silica research can play a vital role in building a more sustainable future for Uganda and beyond.

Stay tuned for future updates on our bio-silica research endeavors. Together, through collaboration and innovation, we can unlock the potential of this revolutionary material and cultivate a brighter future for all.

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# Bio-Silica Research Takes Center Stage at MUST Workshop

Mbarara University of Science and Technology (MUST) recently hosted a dynamic workshop for engineers under the Higher Education Partnerships in Sub-Saharan Africa (HEP SSA) program. Themed "Harmonizing Innovation: Collaborative Synthesis of Bio-Silica Nanoparticles Derived from Rice Husk for Various Industrial Applications," the three-day event took place from June 4th to 6th, 2024, at the Kihumuro campus. It brought together researchers, students, and industry partners from across Uganda and beyond.

Dr. Farad Sagala, the project leader and chair of the organizing committee, provided highlights of the HEP SSA project. He emphasized the collaborative nature of the initiative, involving MUST and Makerere University in Uganda, Imperial College London, the University of Namibia, and Abubakar Tafawa Balewa University in Nigeria. Dr. Sagala explained the benefits of collaboration and said:

- Combining Expertise: Different institutions contribute unique strengths and areas of focus.
- Sharing Resources: Institutions can share valuable resources like laboratories, equipment, or datasets.
- Enhanced Learning: Collaboration fosters knowledge exchange between students and researchers.
- Building Reputation: Successful partnerships can elevate the reputation of all involved institutions.

**Eng: Farad Sagala giving opening Remarks**

The Dean Faculty of Appied Science and Technology, Dr. Johnes Obungoloch said the Faculty was thrilled to see a diverse audience for a purpose of a Collaborative Synthesis of Bio-Silica Nanoparticles for Industry" workshop. He said the three-day event promises to be a landmark occasion, fostering a vibrant exchange of ideas and propelling advancements in the field of bio-silica research.

Johnes said the very theme of the workshop, "Harmonizing Innovation," underscores the significance of collaboration and MUST, embraces-bringing together the diverse expertise and resources of institutions like Makerere University, Imperial College London, and many others, we can unlock the full potential of bio-silica – a revolutionary material derived from a readily available resource, rice husk.

He vowed full support from the University, particularly the Faculty, " we are dedicated to remaining at the forefront of this field, and your contributions will be instrumental in achieving this goal".Johnes said. He concluded by thanking everyone joining the exciting journey to unlock the transformative potential of bio-silica as a collaborative effort. altogether. He acknowledge the dedication and diligence of Dr. Sagala as the PI and Chair of the organizing committee

Expressing his excitement for the presentations, The University Secretary Mr. Melchoir Byaruhanga thanked the partners who had come to the workshop and considered MUST, he said he could not wait to hear from the presenters since he is a farmer. He then declared the event officially open.

Mr. Melchoir Byaruhanga University secretary

The collaborative spirit extended beyond academia. Mr. Aggrey Mugume, National Content Officer at the Petroleum Authority of Uganda, acknowledged the importance of bridging the gap between academic research and industry applications.

Mr. Aggrey Mugume giving his remarks

The Head of Department (HOD) for Energy, Mineral, and Petroleum Studies expressed his gratitude at the HEP SSA Workshop. He thanked the Public Relations Officer (PRO) for organizing the event and acknowledged the presence of the University Secretary, the Dean of the Faculty of Applied Sciences and Technology (FAST), and other esteemed guests.

He also extended his appreciation to the project collaborators: Professors John Baptist Kirabira, Cheikh Youssef Ahmad, Robinson I. Ejilah, and Ann Muggeridge from Makerere University, University of Namibia, Nigeria, and Imperial College London, respectively.

The HOD specifically recognized Dr. Farad Sagala's leadership on the project and his contributions to promoting departmental research. He highlighted the department's growth and positive national and international recognition, particularly with its pioneering undergraduate program in Petroleum Engineering and Environmental Management.

He emphasized the significance of nanotechnology as a cutting-edge technology with vast potential to address challenges in various fields like medicine, health, energy, engineering, and water treatment. He described the research at MUST as a fantastic opportunity for students and staff to explore the industrial applications of this technology, particularly the use of bio-silica nanoparticles derived from rice husks.

Eng. Patrick Kabanda

## The Presentation were as below


This was followed by students presentation. 12 students pitched their Masters project in line with the workshop these included: 1) Andrew Ngabirano 2) Hadija Namisango 3) Nabuuma Josephine 4) Kirabo Solome (MAK) 5) Sebiraza Stephen(MAK) 6) Ssemambo Stephen V (MAK) 7) Ssebulime Stephen (MAK) 8) Kugonza Mpoza 9) Rutaraka Gideon 10) Babirye Prudence 11) Ssebulime Stephen 12) Frank Mujurizi


The presentations focused on the potential of bio-silica nanoparticles derived from rice husk. They were showcasing their ongoing work on utilizing bio-silica nanoparticles for wastewater treatment, oil spill removal, enhanced oil recovery (EOR), and even pharmaceutical applications.

This was followed by Ms. Lillian Akampa a research assistant on the project who shared the Highlight on Biosilica


Highlight on Cutting edge Engineering Research in Africa was a paper by Prof. Joseph Kirabira, Presented by Dr. Ronald Kayiwa from the College of Engineering, Design, Art and Technology Makerere University, Kampala,

Highlight on Cutting edge Engineering Research in Africa was a paper by Prof. Joseph Kirabira, Presented by Dr. Ronald Kayiwa from the College of Engineering, Design, Art and Technology Makerere University, Kampala.


Ms. Lillian Akampa a reseach assistant presenting


Dr. Kayima presenting

**Day Two: Bio-Silica Applications and Industry Perspectives**

• Day two of the workshop centered around presentations from esteemed international guests: Professor Ann Muggeridge from Imperial College London, Professor Cheikh Youssef Ahmed from the University of Namibia, and Professor Robinson Ichakpa Ejilah. Their presentations focused on the functions and benefits of bio-silica in their respective countries.Doctors Florence Nantaba, Vianney Andrew Yiga, Ronald Kayiwa, and Moses Kigozi from Makerere University, explored the environmental and industrial applications of these nanoparticles.


professor Cheikh Youssef Ahmed

Professor Ahmed explored the potential applications of bio-silica nanomaterials in agriculture, particularly highlighting their relevance to practical needs within the agricultural industry. This industry perspective ensures research efforts are aligned with real-world challenges. For example, in Namibia and South Africa, bio-silica is already being utilized as a fertilizer for horticulture and growing vegetables.

Professor Muggeridge's presentation was about Enhancing Research Skills and Proposal Writing.

Professor Ejilah's discussion resonated strongly with the audience, emphasizing the critical need for "building bridges" between academia and industry sectors.


Professor Ann Muggeridge


Professor Robinson Ichakpa Ejilah

All presentations fostered an interactive environment, concluding with Q&A sessions that allowed for further exploration of the topics.

Mr. Aggrey Mugume also provided valuable insights into the current state of Uganda's oil and gas sector. Additionally, Professor John Baptist Kirabira represented by Dr. Ronald Kayiwa from Makerere University Kampala (MUK) offered his expertise on a related topic Challenges and Opportunities in Engineering Education.


Mr. Aggrey Mugume from Petroleum Authority of Uganda

Dr. Sagala provided some interesting insights into bio-silica applications specific to Uganda for enhanced oil recovery applications (EOR) he shared the benefits and potential of bio-silica by other countries as below.

Namibia: Applications of bio silica as a fertilizer for Agriculture by AVAGRO Namibia

Nigeria: Used by the Nigerian Military in making face masks that can absorb toxic gases

United Kingdom: Application in carbon capture and storage (CCS)

Mentors presented papers in respect to their specialization. However, these were challenged by the moderator to take up their seats with a dance in respect to tunes as the students cheered them.

## The presentations were as below:

Dr. Florence Nantaba: Pharmaceutical residues in the environment: safe use and disposal of pharmaceuticals as a route to combat this challenge

Doctors: . Andrew, Florence Moses and Kenneth

Dr. Kenneth Ssekatawa: Nanoparticles in drug delivery

The students continued their presentations in line with their research topics at both undergraduate and postgraduates and these focused on: Bio silica application for various industrial applications

Dr. Vianney Andrew Yiga: Synthesis and characteristics of rice husks derived bioplastic films

Dr. Moses Kigozi: Materials Characterization Techniques.

## Day 3: Inspiration and Growth at the Nanotechnology

The third day of the workshop proved to be an enriching experience, filled with insightful presentations from esteemed academics. Presentations were by both Lecturers and students, these included:

Professor Ejilah Robinson's presentation was about industry-academia collaboration further fueled my enthusiasm for research. His emphasis on the importance of synergistic relationships was spot-on. Professor Robinson encouraged students to network at Regional and International levels.


Professor Ann Muggeridge's presentation on CO2 capture and storage particularly resonated with me. Her focus on the potential of nanoparticles in mitigating climate change aligns closely with my interests in environmental management. It was inspiring to see the possibilities of scientific advancements in tackling real-world challenges.


Professor Cheikh Youssef Ahmad's talk on supervisor-student relationships in research offered valuable insights into effective mentorship. He highlighted the importance of fostering a supportive research environment, which I believe is crucial for success.

Later on, The students' presentations were about 5 students from MUST and MUK presented about their ongoing research on the application of Bio silica nanomaterials for improving oil recovery. These presentations included a poster presentation from one of the Undergraduate students, Demmerle Phillip Martin. This presentation was an extract from his work that formed his BSc degree thesis.

## The Dean Faculty of Applied Sciences andTechnology gave a recap of the event


Dr. Johnes Obungoloch -Dean FAST

The Dean of the Faculty of Applied Science and Technology Dr. Johnes Obungoloch delivered a recap of the Biosilica Workshop, highlighting its key takeaways. He addressed the audience as "esteemed colleagues, students, and industry partners," emphasizing the workshop's role in fostering collaboration and igniting a passion for sustainable innovation.

The Dean focused on the presentations showcasing biosilica's potential, derived from natural sources like rice husks. He mentioned the valuable insights gained on optimal extraction, characterization, and applications, both for experienced researchers and newcomers to the field.

He further reported that the workshop celebrated achievements in biosilica research, detailing advancements and applications across various industries. However, the Dean reportedly emphasized the workshop's true power: a glimpse into a promising future. The palpable collective energy and enthusiasm signaled continued breakthroughs and significant global impact from biosilica research.

The Dean reportedly concluded by expressing his sincere gratitude to the organizers for creating such a dynamic and informative event. He stated that the Biosilica Workshop undoubtedly propelled progress in harnessing this sustainable material for a brighter future. He later invited the Deputy Vice Chancellor to address the attendees on behalf of the University Administration

# Closing remarks: Deputy Vice-Chancellor F&A Champions Collaboration at Science Workshop


Prof. Charles Tushabomwe-Kazooba

As the workshop came to an end, the Deputy Vice Chancellor for Finance and Administration, Associate Professor Charles Tushabomwe Kazooba, represented Vice-Chancellor Professor Celestino Obua who was away on other official duties. He actively participated and expressed his gratitude to the organizers, specifically Dr. Sagala, for including young scientists in the workshop. "These young stars will be the mentors of future generations," Professor Kazooba remarked. He added that being allowed to present a project amongst such brilliant minds was an invaluable experience. It opens their eyes to the vast potential of nanotechnology and further boosts my passion for research and innovation.

Charles also commended the diversity of participants, highlighting the importance of collaboration. "In our academic days," he said, "we used to believe in 'publish or perish.' However, I believe this has shifted to 'collaborate or perish.' Collaboration allows for publication, connection, networking, and much more."

Professor Kazooba shared a story about an entrepreneur from Mbarara University of Science and Technology's Faculty of Business and Management Sciences. This individual established a business in a small town, occupying the middle store of a three-unit block. The store was well-organized, resembling a supermarket, but lacked branding. Soon after, another business with a similar concept opened on the left side, branding itself as a purveyor of "cheap commodities." Another competitor emerged on the right, advertising "high-quality goods."

Instead of succumbing to competition, the MUST student, with a touch of ingenuity, displayed a single sign: "Entrance." He then proposed a collaboration to his fellow business owners: remove the dividing walls, effectively merging their shops while retaining their individual branding and closed doors. This strategy proved successful, as the businesses thrived together. They are now planning to expand with a second outlet.

The moral of the story, as Professor Kazooba emphasized, is that collaboration leads to achievement, and others can benefit from such a union. Mbarara University of Science and Technology is a reputable institution, but collaboration is key to achieving even greater success.

"Let us collaborate, collaborate, and collaborate positively," he concluded

In a spirit of social interaction, the attendees were treated to a tour of Lake Mburo National Park. Led by a knowledgeable guide, they were able to fully appreciate the park's stunning scenery, teeming with diverse flora and fauna. The team thoroughly enjoyed their exploration of this remarkable park.

All this can be followed live-streaming on the link below https://youtube.com/live/u6j86jxUBqk?feature=share
twitter https://x.com/MbararaUST/status/1798295877590843628
Facebook https://www.facebook.com/MbararaUniversity
Instagramhttps://www.instagram.com/p/C73kND2I-6wh/?utm_source=ig_web_copy_link&igsh=MzRlODBiNWFlZA==

# In their words about the Bio-Silica Workshop

**KAYIIZI STEPHEN KASASA**
**Year IV PETROLEUM ENGINEERING STUDENT (MUST).**

## Bridging Minds, Building a Sustainable Future

The recent symposium held at Mbarara University of Science and Technology marked a significant milestone in harnessing the potential of bio-silica nanoparticles derived from rice husk. This groundbreaking event served as a powerful testament to the importance of interdisciplinary collaboration in driving sustainable innovation.

By bringing together experts from diverse fields, the workshop fostered a vital exchange of knowledge and the formation of key partnerships. These connections pave the way for exciting advancements in nanotechnology and its industrial applications, ultimately contributing to a more sustainable and technologically advanced future.

Bio-silica nanoparticles, derived from a readily available natural resource like rice husk, hold immense promise due to their unique properties and environmentally friendly production methods. Their potential applications range from drug delivery and agriculture to waste reduction, pharmaceuticals, and even cosmetics.

The workshop also delved into Carbon Capture and Storage (CCS), one of the most promising technologies within the global energy sector. CCS offers a crucial tool for mitigating climate change by significantly reducing greenhouse gas emissions from key industries, contributing to the achievement of global climate targets. However, widespread adoption of CCS faces challenges, including cost reduction, technological advancements, and the need for robust regulatory frameworks along with public acceptance.

Professor Ann Muggeridge, a distinguished figure from the Royal Academy of Engineering and Imperial College London, provided a thought-provoking presentation on this evolving energy technology. CCS involves capturing carbon dioxide emissions from power plants and industrial facilities and then safely storing them deep underground in geological formations, such as depleted oil and gas fields or deep saline aquifers. This process effectively prevents these harmful emissions from entering the atmosphere.

The workshop proved to be an invaluable experience for me personally. It provided a wealth of knowledge, practical skills, and the opportunity to forge professional connections. The event underscored the crucial role of sustainable innovation and the vast potential of bio-silica nanoparticles. The momentum gained at this workshop lays a strong foundation for future research and industrial applications in nanotechnology, paving the way for a more sustainable future SUCCEED WE MUST!

**Kirabo Solome**
**Msc Chemistry Student Makerere University**

## A Celebration of Innovation: Reflecting on the Biosilica Workshop

The biosilica workshop was a resounding success! It brought together a vibrant community of innovative minds – students, professors, and industry experts – all united by their passion for sustainability. The research proposals presented were truly groundbreaking, and the feedback sessions proved to be incredibly valuable. What truly resonated with me was the genuine enthusiasm and collective energy that permeated the room. It was evident that everyone was there to learn, develop their knowledge, and make a significant impact. A big round of applause to the organizers for creating such a dynamic and inspiring event!!"

The Bio-silica workshop at MUST provided an opportunity to learn about conducting research collaboratively. We gained knowledge and skills from experienced academics. We presented our research proposals and received valuable guidance for improvement. The workshop also facilitated interaction with researchers from other institutions, allowing us to learn about research approaches at different universities.

The workshop featured presentations by professors and doctors on diverse academic topics. These presentations exposed me to the practical applications of research in the real world.

The organizers provided excellent facilities, including accommodation, transportation, meals, and even a post-workshop excursion. This excursion offered me the opportunity to visit Lake Mburo National Park for the first time.

The workshop fostered new friendships and connections. Notably, I found a supervisor for my research project on developing bio-silica nanoparticles from rice husks for oil spill remediation. We also had the chance to learn from a PAU representative about the Ugandan oil sector, opening doors to further opportunities.

**My key takeaways:**

- The importance of collaboration in research.
- The abundance of research opportunities in Sub-Saharan Africa.
- Advancements in research and existing gaps in nanoparticle technologies.

I extend my sincere gratitude to the workshop organizers for providing us with the opportunity to learn from experts in the field. This experience has significantly boosted my confidence in my research journey.

**NGABIRANO ANDREW MSME,**
**Makerere University**

## Building a Strong Foundation: My Takeaways from the Biosilica Characterization Workshop

This workshop at Mbarara University of Science and Technology (MUST) proved to be an enriching experience. I gained valuable knowledge on proposal writing, essential for any aspiring researcher. Additionally, the workshop delved into the diverse equipment employed for characterizing biosilica derived from rice husks, equipping me with crucial analytical tools for my research. The emphasis on collaboration with colleagues resonated deeply, highlighting the importance of teamwork in scientific exploration.

The welcoming atmosphere fostered by the MUST team made me feel right at home throughout the workshop. The open and interactive format, where questions were encouraged, further enhanced the learning experience. My stay at MUST was truly enjoyable, and I'm eager to leverage the knowledge gained here as a springboard for my research career. My sincere thanks to Dr. Sagala for organizing such an engaging and informative workshop.

**GIDEON RUTARAKA**
**MSc. Mechanical Engineering**
**Makerere University**

## University-Industry Collaboration Drives Biosilica Innovation

**Namisango Hadija**
**Msc. Chemistry Student.**
**Makerere University**

This workshop highlighted the critical role of collaboration between universities and industries. By leveraging the potential of biosilica, these partnerships can foster groundbreaking research advancements. Renowned speakers shared their experiences with successful collaborations, emphasizing the benefits of interdisciplinary approaches. The importance of strong supervisor-student relationships in research projects was also underscored, providing valuable insights into effective mentorship. The event offered a rich environment for knowledge exchange, networking, and inspiration, motivating me to explore new avenues in collaborative research.

**KOBUSINGE GRACE AKIIKI**
**Year IV PETROLEUM ENGINEERING STUDENT (MUST).**

## Unveiling the Potential of Bio-Silica Nanoparticles

My experience attending the workshop titled "Harmonizing Innovation: Collaborative Synthesis of Biosilica Nanoparticles Derived from Rice Husks for Various Industrial Applications" was nothing short of remarkable. It surpassed all my expectations and provided a comprehensive immersion into the exciting world of nanoparticle research and its diverse applications.

The workshop featured a captivating guest lecture series that broadened my understanding of the real-world potential of bio-silica nanoparticles. The series covered the entire process, from synthesis and characterization to application in developing bioplastic films, absorbing heavy metals, delivering drugs, and even enhancing oil recovery – just to name a few. These sessions vividly showcased the immense potential of sustainable materials in various fields.

Learning about these cutting-edge technologies underscored the profound impact nanoparticles have on various industries, from agriculture and pharmaceuticals to oil recovery. The workshop also offered a valuable opportunity to interact with industry professionals, gaining insights into their diverse skillsets and experiences in research and innovation.

The sessions were meticulously designed to foster interaction and knowledge exchange. This open format allowed me to freely ask questions, sparking discussions between students and experts from Mbarara University, Makerere University, and other institutions across Africa and the globe. This diverse participation led to meaningful exchanges and created a collaborative environment that will undoubtedly pave the way for future research and development projects.

Furthermore, key sessions by Professor Ann Muggeridge on enhancing research skills and proposal writing, and Professor Robinson Elijah on managing research collaborations, equipped me with practical strategies for effective research and project management. Professor Robinson, using the evocative analogy of geese flying in formation, emphasized the importance of teamwork and collaboration in maximizing the potential of engineering research. These sessions served as a powerful reminder of the critical role proper planning, clear communication, and collaborative efforts play in achieving research excellence.

Ultimately, this workshop provided an invaluable opportunity to refine my research skills, connect with experts and fellow students from various universities, and explore novel applications for biosilica nanoparticles. The knowledge and experiences gained will undoubtedly propel my professional development and inform the direction of my future research projects.

**AINEMBABAZI SHEFRAH YEAR III PETROLEUM ENGINEERING STUDENT(MUST).**

**A Resounding Success: Bio-Silica Nanoparticles Workshop**

The recent three-day workshop titled "Collaborative Synthesis of Bio-Silica Nanoparticles from Rice Husks for Industrial Applications," held from June 4th to 6th, 2024, proved to be a resounding success. Dr. Farad's meticulous organization brought together a global community of experts and awardees to explore the vast potential of bio-silica nanoparticles.

Interactive sessions, feedback opportunities, and well-timed networking breaks fostered a dynamic learning environment. Participants delved into various topics, including the synthesis, characterization, and industrial applications of bio-silica nanoparticles, with a focus on sectors like petroleum, cosmetics, and pharmaceuticals.

A particularly insightful presentation came from Mr. Mugume Aggrey, representing the Petroleum Authority of Uganda (PAU). He outlined the PAU's vision of becoming a leading petroleum regulatory agency, its mission focused on regulating and monitoring the sector for societal benefit and attracting sound investment. Mr. Aggrey also highlighted the potential applications of bio-silica nanoparticles within the petroleum industry.

The collaborative atmosphere fostered by the workshop facilitated meaningful connections among participants. The final day's relaxing trip to Lake Mburo served as a wonderful capstone to the event.

Key Takeaways:

- The workshop fostered a collaborative environment, encouraging open discussions and idea-sharing.
- Interactive sessions and feedback opportunities allowed for a deeper understanding of bio-silica nanoparticles and their potential applications.
- The importance of interdisciplinary collaboration in advancing research was emphasized.
- The vast potential of bio-silica nanoparticles across various industries was showcased.
- The need for further research and development in this field was acknowledged.

Dr. Farad's dedication to organizing this enriching workshop is greatly appreciated. The lessons learned will undoubtedly have a lasting impact on participants' future endeavors. The workshop successfully "harmonized innovation," paving the way for potential breakthroughs in bio-silica nanoparticle research and applications.

**Demmerle Phillip: Petroleum Engineering and Environmental Management Graduand(MUST)**

Bridging the Gap: Bio-Silica Nanoparticles and a World of Possibilities

Participating in the workshop titled "Harmonizing Innovation: Collaborative Synthesis of Bio-Silica Nanoparticles Derived from Rice Husks for Various Industrial Applications" proved to be an enlightening experience. It significantly bridged the gap between academia and industry for me, showcasing the transformative potential of bio-silica nanoparticles and their diverse applications across various sectors.

The workshop delved into the exciting realm of nanoparticle applications, ranging from healthcare and agriculture to the petroleum sector and environmental management. One of the most captivating aspects was learning about the innovative ways these nanoparticles are being used. In medicine, for example, the concept of nanobots for drug delivery represents a revolutionary approach, promising targeted and efficient treatments with minimal side effects.

The proposed use of bio-silica nanoparticles to prevent potato rot was another example of how nanotechnology can enhance food security and agricultural sustainability. This application has the potential to significantly reduce crop loss and contribute to a more stable food supply.

Another fascinating application explored the use of nanoparticles in wastewater cleaning.

This holds significant promise for addressing the global challenges of water scarcity and pollution, offering a potential solution for cleaner water sources. The workshop's emphasis on collaboration between academia and industry highlighted the importance of working together to translate research into real-world solutions. This collaborative spirit, coupled with the vast potential of bio-silica nanoparticles, opens doors to exciting advancements in various fields.

## Biosilica Workshop: A Showcase of Progress and Future Potential

**Ssebulime Stephen**
**Msc. Chemistry Student**
**Makerere University**

The biosilica workshop proved to be exceptionally informative. The presentations delved into the fascinating world of biosilica, offering valuable insights into its optimal extraction, characterization, and diverse applications. Beyond the technical aspects, the workshop also highlighted the significant milestones already achieved in biosilica research and offered an insight glimpse of the exciting possibilities that lie ahead

# MUST Connects to the world: Meet our international presenters

**Ann Muggeridge Title: Professor Institution:** Dept. of Earth Science and Engineering, Imperial College London Biography: Prof. Muggeridge leads a research group focusing on methods for improving the security of geological storage of CO2 applying her expertise in EOR methods, including upscaling and numerical methods for predicting fluid flows in the subsurface. Following her DPhil in Atmospheric Physics at the University of Oxford she joined the BP Research Centre, followed by a service company (SSI (UK) Ltd) before joining Imperial College in 1995. Prof. Muggeridge chaired the organizing committee for the EAGE IOR Symposium in 2015, 2017 and 2019 and the Scientific Advisory Committee for the National IOR Centre of Norway 2016-2021.

**Cheikh Youssef Ahmad PhD Title: Professor Institution: University of Namibia Country:** Namibia Dr. Cheikh Youssef is an Associate Research Professor under the Multidisciplinary Research Services (MRS), Center of Research Services (CRS), University of Namibia. His research focuses on the ethnobotanical knowledge of medicinal plants, traditional fruits and vegetables, functional ingredients, food biotechnology, the development of food-grade supplements with biological activity for product safety and potential applications as well as examining the nutrition and safety of traditional food and beverages.

**Robinson Ichakpa Ejilah PhD Title: Professor Institution:** Abubakar Tafawa Balewa University Country: Nigeria Dr. Ejilah is a professor of Energy Studies at Abubakar Tafawa Balewa University, Nigeria. His impressive academic background combines a PhD in Mechanical Engineering with a master's in information technology, showcasing his diverse skillset. Beyond his core qualifications, Dr Ejilah is a registered engineer in both Nigeria and the UK, and he holds certifications in conflict resolution, non-proliferation, and entrepreneurship – a testament to his well-rounded expertise.

Dr. Elijah's contributions extend far beyond the classroom. He has played a pivotal role in shaping the Nigerian engineering landscape. During his tenure as the 13th National Chairman of the Nigerian Institution of Mechanical Engineers (NIMechE), he spearheaded initiatives that fostered international collaboration, research and development, and essential skills training programs for Nigerian engineers. His leadership led to active partnerships with prestigious organizations such as the Royal Academy of Engineering and the Institution of Mechanical Engineers (UK), promoting knowledge exchange and propelling Nigeria's engineering sector forward. Dr. Elijah's passion extends beyond national borders, as he is a fervent advocate for sustainable development and global cooperation. He actively participates in international endeavours, including the UN Secretary-General's Roadmap on Digital Cooperation.

His dedication to a sustainable future is further evidenced by his involvement in the Royal Academy of Engineering's projects on engineering education and renewable energy, as well as his role with Engineers Without Borders (EWB).

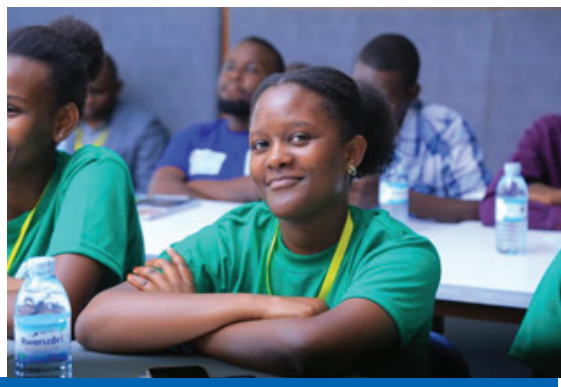
This dedication is further recognized through his prestigious role as a 2024 Expert Advisor for the Earth shot Prize, a testament to his expertise in tackling environmental challenges. Dr. Ejilah is a champion for inclusivity within the engineering profession. He is a recognized leader in open-source technology and social innovation and an alumnus of various programs promoting change-making and entrepreneurship in Africa. His belief in a diverse and inclusive engineering landscape is exemplified by his work with the NENIS Foundation Advocacy Team, where he played a key role in developing a comprehensive diversity and inclusion policy for the Nigerian engineering community. Dr Elijah's dedication extends to his research endeavours. As a prolific researcher, he has authored over 50 published papers on energy studies and related fields. His research is recognized internationally, contributing significantly to advancements in sustainable solutions. Dr. Robinson I. Ejilah stands as a remarkable figure in African engineering, and his unwavering dedication to progress, sustainability, and inclusivity positions him as a key leader in shaping a brighter future for the continent.

## Ways forward/ Recommendations from MUST and MUK

A follow-up committee comprising of staff from both MUST and MUK should ensure that the pitched students' proposals take shape and later follow up on the outputs from each study.
More collaborative engagements should be nurtured at levels of proposal writing to improve chances of funding by bringing onboard multi-disciplinary researchers from across Africa.

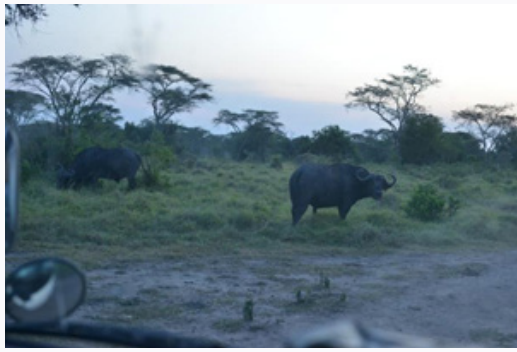
## What were the learning opportunities?

Such workshops should be scaled across other faculties. These may not require costly logistics and can be organized internally. Through such, capacity can be built among staff regarding proposal writing, grants management, research output dissemination etc..



# Biosilica Workshop: A Celebration of Science and Nature

The Biosilica Workshop concluded on a high note, leaving a lasting impression on all participants. This exceptional event, held at MUST in Mbarara, Uganda, brought together a vibrant community of students, professors, and industry experts. United by their passion for sustainability, they delved into the fascinating world of biosilica, a naturally occurring material with immense potential.
Following the workshop, participants enjoyed a relaxing visit to Lake Mburo National Park, immersing themselves in Uganda's beautiful natural world. Here, guests were treated to a breathtaking display of Uganda's diverse flora and fauna. Immersed in the beauty of the park, they were able to unwind and connect with nature after a productive few days of scientific exploration.



# Dr. Farad Sagala:
# A Distinguished Researcher in Enhanced Oil Recovery

Dr. Farad Sagala is a prominent researcher and academic with a remarkable background in petroleum engineering. He is a leading figure in the field, making significant contributions to advancing oil extraction methods.

**Current Role:**

- Senior Lecturer, Department of Petroleum Engineering, Mbarara University of Science and Technology
- Conducts research on nanotechnology for various industrial applications

**Teaching:**

- Teaches a wide range of graduate and undergraduate courses in Petroleum Engineering, including:
  - Enhanced Oil Recovery
  - Thermodynamics
  - Production Engineering
  - Reservoir Engineering
  - Waterflooding
  - Oil and Gas Processing
  - Fundamentals of Fluid Flow in Porous Media


**Research:**
Dr. Sagala's research focuses on utilizing nanotechnology for Enhanced Oil Recovery (EOR). His PhD research involved synthesizing and evaluating silicate-based nanoparticles for this purpose. He continues to explore the application of nanofluids in EOR, along with existing techniques like smart water injection. He combines experimental techniques with modeling to optimize these methods.

**Dr. Sagala's Achievements:**

- Published numerous peer-reviewed journal articles
- Presented research at various conferences
- Active member of the American Chemical Society (ACS) and the Society of Petroleum Engineers

**Current Research Projects:**

- **2024-2025:** "Harmonizing Innovation: Collaborative Synthesis of Biosilica Nanoparticles Derived from Rice Husk for Various Industrial Applications" (HEPSSA award, Royal Society of Engineering, UK) - This collaborative project involves Imperial College London, University of Namibia, Cape Peninsula University of Technology (South Africa), Makerere University, Abubakar Tafawa Balewa University (Nigeria), and Petroleum Authority Uganda (industrial partner).
- **2023-present:** Principal Investigator (PI) on "Integrating Low Salinity Water With Polymer Grafted Silica Nanomaterials For Heavy Oil Recovery" (TWASA-UNESCO)
- **2023-present:** "Integrating Bio-Silica Nanoparticles Obtained From Rice Husk With Anionic Surfactants For Enhancing Oil Recovery For Uganda's Oil Fields" (Directorate of Research and Graduate Training)
- **2023-present:** "Surfactant Screening for Uganda Oil Reservoirs Based on Emulsification Studies: Phase 1" (Directorate of Research and Graduate Training)
- **2023-present:** "Improving Ugandan Roads by Incorporation of Bio-silica Nanoparticles Extracted from Rice Husks in Asphalt Mixtures: A Sustainable Approach" (Directorate of Research and Graduate Training)
- **2022-2023 present:** PI on "Novel catalytic conversion of Plastics to Fuel Oils" (Mbarara University, Uganda)
- **2022-2024 Present:** Co-PI on the ACS Petroleum Research Fund (PRF) project: "Low salinity water flooding coupled with polymer/surfactant grafted nanoparticles: Mechanism and Simulation"
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Thanks for joining us today !

**Education:**

- Post Doctoral Fellow, University of Calgary, Canada
- Ph.D. in Chemical and Petroleum Engineering, University of Calgary, Canada
- M.Sc. in Science (Petroleum Engineering), University Technology Malaysia (UTM)
- B.Sc. in Engineering (Biosystems Engineering), Makerere University

**Publications and CV:**

- Several publications: (Dr. Farad Sagala - )
- Curriculum Vita: (farad-academic-cv-june.pdf (sagopec.com)

## Appreciation by the vice Chancellor

On behalf of Mbarara University of Science and Technology, we want to extend our heartfelt congratulations to Dr. Farad Sagala on his remarkable achievements in research and academia.

Your dedication to pushing the boundaries of Enhanced Oil Recovery (EOR) and your commitment to sustainable solutions, like incorporating bio-silica nanoparticles into Ugandan roads, is truly a definition of your exceptional talent and vision. Your research is not only groundbreaking but also holds significant potential to benefit the oil and gas industry and our nation's infrastructure development.

We are particularly proud of your leadership in collaborative projects like "Harmonizing Innovation," which exemplifies your commitment to fostering international partnerships for impactful research.

Dr. Sagala, your contributions to the field of petroleum engineering are a source of immense pride for MUST. We offer our sincere congratulations and best wishes for continued success in your future endeavors as you create visibility for our institution as well as serving our Nation Uganda.

Succeed we MUST.

Prof. Celestino Obua  Vice Chancellor MUST

# Acknowledgement


Special thanks to the editorial and organizing team headed by Dr. Farad Sagala, who also serves as the RAEng-HEPSSA Project Lead for 2024/2025. Dr. Sagala is a Senior Lecturer in the Department of Petroleum Engineering within the Faculty of Applied Science and Engineering at Mbarara University of Science and Technology (MUST).
Engineering within the Faculty of Applied Science and Engineering at Mbarara University of Science and Technology (MUST). We extend our gratitude to, and his colleagues for their unwavering support in organizing this workshop.

To our partners Prof. John Baptist Kirabira of Makerere University, Kampala, and the team at CEDART for their mentorship and academic guidance, along with his team of eminent scholars. Professor Ann Muggeridge from Imperial College London, Professor Cheikh Youssef Ahmed from the University of Namibia, and Professor Robinson Ichakpa Ejilah. To other mentors your support and participation cannot be taken for granted, thank you,. Doctors Florence Nantaba, Vianney Andrew Yiga, Ronald Kayiwa, and Moses Kigozi from Makerere University. The students at MUST and those at MUK your participation was so timely.

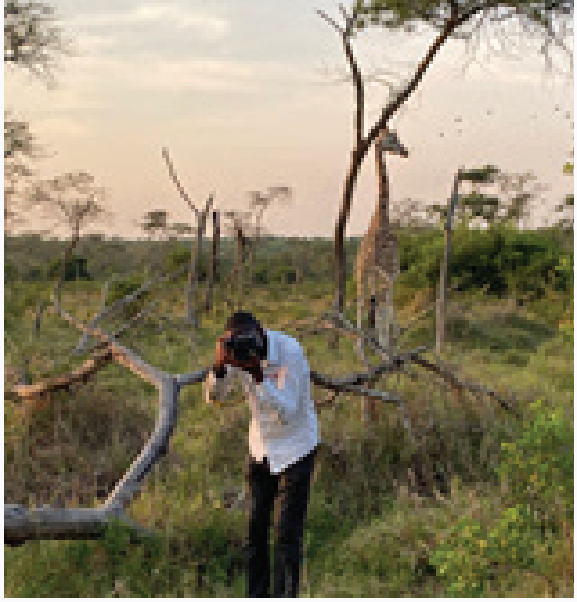
We also acknowledge the crucial assistance from the MUST Grants Office, with special recognition to Ms Margaret Mbabazi for her exceptional role in facilitating grant management.

Special appreciation goes to the communication Team led by Ms. Angella Nakato the Public Relations officer, for the good publicity before during and after the event. The team enabled the event's presence both digital and physical. This was notably good quality.

Angella Nakato Moderator

Our sincere gratitude goes to the leadership and management of Mbarara University of Science and Technology for their commitment to fostering research growth and providing an environment conducive to productive grant writing and successful implementation. A heartfelt thank you to all who have contributed in various roles and capacities to the activities leading up to this workshop. Your dedication and hard work have been invaluable.

Sumaiya Nalukwago Social Media



John Mukundane Photographer

## Socializing for Energy at the Conference

To help energize participants and induct our international guests into Ugandan culture, the moderator requested , the Dean FAST Dr. Johnes Obungoloch, Dr. Ronald Kayiwa and Moses Kigozi, and , offered them traditional Ugandan names.

This lighthearted tradition involved:

Dr. Johnes giving Professor Ann Muggeridge the name Apio, inspired by his own twin daughter. Prof. Ann became Prof. Ann Apio.


Johnes,Ronald and Moses

Welcome Prof. Apio Ann

Apio Ann wave to the crowd

Dr. Ronald presenting Professor Robinson Ichakpa Ejilah with the name Waiswa, symbolizing the firstborn male twin who traditionally takes on leadership roles.

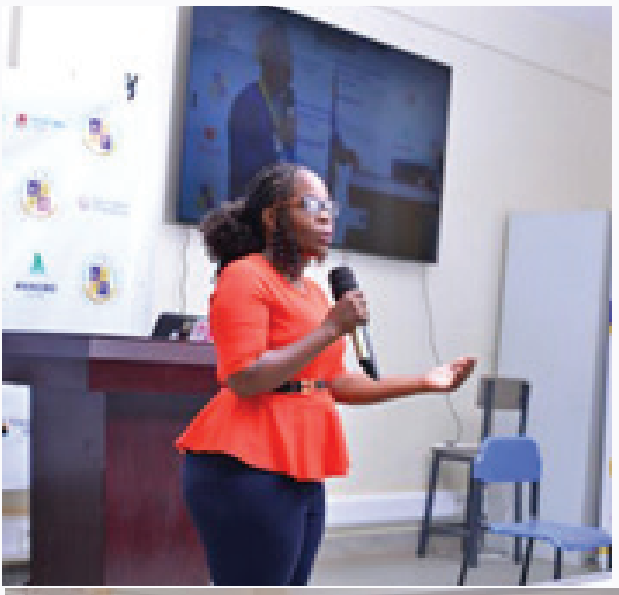
*Let us welcome Prof Waiswa Robinson Ichakpa Ejilah Waiswa Robinson wave to the people*

• Dr.Moses bestowing the name Kato upon professor Cheikh Youssef Ahmed another reference to a boy twin.The belief is that last-born children often receive additional blessings.

Professor Kato Cheikh Youssef stand up Kato Cheikh wave to the people

# Beyond the Name Game:
# Team Building Activities

In addition to this cultural immersion, attendees actively participated in a variety of team-building activities and energizers, further fostering a sense of connection and boosting overall conference engagement.



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