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BITRI Newsletter

BITRI and BUAN Sign MoU

Unlocking the Code of Life: A Dive into Genomics and Its Multifaceted Applications

Royal Society of Chemistry Grant to Establish a Network for Nanofiber Based Research in Botswana

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TECHNOLOGY SOLUTIONS FROM YOU TO US FOR YOU

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The CEO's Foreword

This Foreword gives me an opportunity to give an overview of activities that Botswana Institute for Technology Research and Innovation (BITRI) has undertaken over the the last quarter of the 2023/24 financial period. Collaboration is integral to research and development, and BITRI collaborates with local and international stakeholders to further national priorities and needs of Batswana.

In this edition you will read about the signing of a collaboration between BITRI and the Botswana University of Agriculture and Natural Resources (BUAN) which signifies a significant step towards advancing research and innovation in Botswana, particularly in critical areas such as agriculture, medicine, natural resources management, environmental management, and information communication technology (ICT). This Memorandum of Understanding (MoU) aims to foster synergy between the two institutions, leveraging their respective expertise to address pressing challenges facing the country, including food security and sustainable development.

Once again BITRI held the Chemistry Festival which underscores the organization's commitment to promoting STEM education among Botswana's youth. Through interactive programs and hands-on experiments, the BITRI cadres worked collaboratively to organise the event, and on the day, worked to inspire students and educators alike, highlighting the practical applications of chemistry in everyday life. By engaging with students from various schools, BITRI seeks to nurture a new generation of scientists and innovators who can contribute to the country's knowledge-based economy.

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Once again, our cadres were actively engaged in imparting knowledge and capacitating learners and academics on the novel fields of genomics, metagenomics, and transcriptomics and their potential to revolutionise our understanding of life at its most fundamental level. Furthermore, BITRI's involvement in molecular biology and genomics reflects its dedication to cutting-edge research with far-reaching implications. By exploring the frontiers of biological science, BITRI is not only expanding our understanding of life at its most fundamental level but also paving the way for breakthroughs in medicine, agriculture, and environmental conservation.

We also made headway on collaboration through the recent workshop that connected researchers from BITRI, the University of Botswana, Botswana International University of Science and Technology, and BUAN. The grant awarded by the Royal Society of Chemistry to establish a network for nanofiber-based research in Botswana highlights the growing recognition of the country's scientific capabilities on the international stage. We are hopeful of cultivating knowledge exchange and attract funding opportunities, further enhancing Botswana's research capacity in this promising area, and we commend our cadres in their effort to drive this initiative

This summary was designed to give you a glimpse into the rich content of this newsletter, and I invite you to indulge the publication for more details. As the country embarks on its journey towards prosperity and sustainable development, BITRI continues to be at the forefront of shaping the future of science and technology in Botswana and beyond, and we aim to achieve that feat in collaboration with you.

Prof. Shedden Masupe
PhD, SMIEEE, PrEng
Chief Executive Officer

BITRI and BUAN Sign MoU

The BITRI Chief Executive Officer Prof. Shedden Masupe (on the right) and the BUAN Vice Chancellor Prof. Ketlhatlogile Mosepele signing the MoU.

Botswana Institute for Technology Research and Innovation (BITRI) and Botswana University of Agriculture and Natural Resources (BUAN) recently signed a Memorandum of Agreement, paving the way for collaboration between the two institutions. This MoU is expected to enhance synergies between these two institutions with complementary expertise, with the potential to make substantial contributions to the fields of agriculture and food security.

The objectives outlined in the Memorandum of Understanding (MoU) include a focus on research in key areas such as Agriculture, Medicine, Natural Resources Management, Environmental Management, and Information Communication and Technology (ICT), research projects in Indigenous Knowledge Systems with the aim of integrating traditional knowledge with contemporary scientific approaches, fostering a holistic understanding of various subjects, community outreach and social responsibility activities, publication of research findings in peer-reviewed publications, and knowledge and technology transfer generated from joint research.

When delivering his speech, the BITRI Chief Executive Officer Prof Shedden Masupe said, "This high-level document works only if there is a project envisaged. And we already have a couple of projects running between us. We are on a transformation journey as a country, and the destination is 'Prosperity for all'. We are also hoping that in this journey along the way, we will become one of the high-income countries."

Botswana Institute for Technology Research and Innovation (BITRI) and Botswana University of Agriculture and Natural Resources (BUAN) recently signed a Memorandum of Agreement, paving the way for collaboration between the two institutions. This MoU is expected to enhance synergies between these two institutions with complementary expertise, with the potential to make substantial contributions to the fields of agriculture and food security.

The BUAN Vice Chancellor Professor Ketlhatlogile Mosepele extolled the commitment of both institutions to advancing knowledge, fostering innovation, and making a positive impact on various aspects of society.

"Our collaboration serves as a platform aimed at the improvement of the lives of Batswana. Our collaboration can and will facilitate Botswana's achievement of most of the UN's Sustainable Development Goals such as SDG1 (No Poverty), SDG2 (Zero Hunger), SDG3 (Good Health and Well-being), SDG7 – Affordable and Clean Energy, SDG11 – Sustainable Cities and Communities, to name but a few."

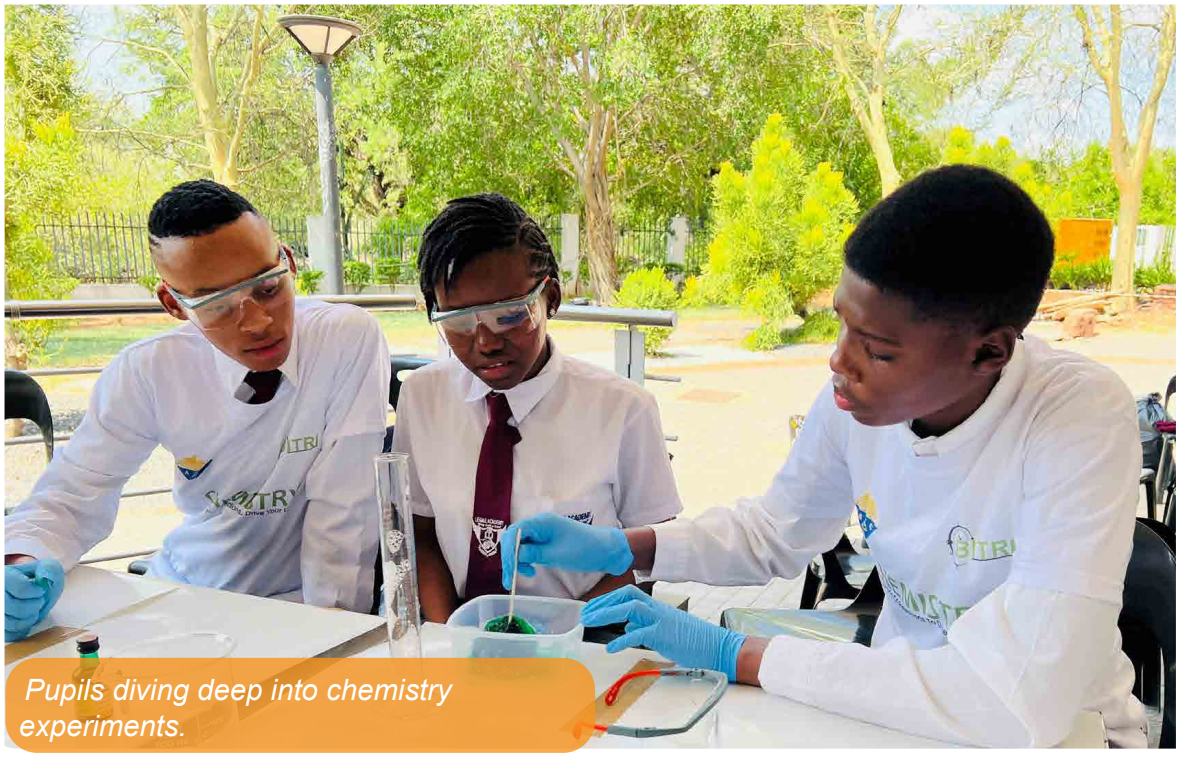
BITRI Hosts the 3rd Chemistry Festival

The Botswana Institute for Technology Research and Innovation (BITRI)* hosted the third edition of the Chemistry Festival on Thursday the 29th of February.

The festival is partially funded by the American Chemical Society (ACS)** and it offers an interactive programme that allows pupils to engage in hands-on Chemistry experiments and selected laboratory tours under the BITRI Centre for Materials Science (CMS).

The theme for the event was '**Chemistry: A World of Reactions to Drive Your Life**'

When delivering his remarks, BITRI Chief Executive Officer Prof. Shedden Masupe reiterated BITRI's strong commitment to promoting STEM (Science, Technology, Engineering, and Mathematics) education, particularly among the young and the youth in Botswana. Prof Masupe said that this commitment is anchored on the Government of Botswana's vision to transform the country into a knowledge-based economy.



Pupils diving deep into chemistry experiments.

To help the pupils understand the practical implications of STEM disciplines and Chemistry, Prof Masupe gave relatable examples, thereby demonstrating wider applications of the field in everyday life, such as the difference in ambient temperature between a house built with wood, mud, and the one built with concrete or conventional brick and mortar. In closing, Prof Masupe gave an overview of the role of the CMS in material fabrication and characterization, and he invited the pupils to commit to pursuing careers in STEM and to actively participate in experiments and fully engage during the familiarization tour of the CMS laboratories..

The Closing Remarks were delivered by the BITRI Lead Researcher – Natural Resources and Materials, Dr. Maitshwarelo Matsheka, who emphasized that the pupils should develop curiosity regarding the possibilities and opportunities in STEM and consider the field for future careers, given its capacity to transform the economy of Botswana and the worl.

Additionally, Dr. Matsheka extended gratitude to teachers who played a critical role in acceding to participating in the festival and availing themselves to provide support and guidance to the pupils during the event.

Maoka Community Junior Secondary School, Legae Academy, Al-Nur School, and Kgale Hill Community Junior Secondary School sent their learners to participate in the event.

Unlocking the Code of Life: A Dive into Genomics and Its Multifaceted Applications

By Kefentse Arnold Tumedi

Mr.Kefentse A. Tumedi

In the heart of Gaborone, at the University of Botswana (UB), a gathering of eager Molecular Biology students assembled, not just to learn, but to explore the frontiers of biological science. This was part of a career fair organised by the UB Biological Sciences Department and, and it brought together over 180 students and 10 staff members. I had the privilege of giving a presentation and introducing these bright minds into the complex, yet fascinating world of genomics, metagenomics, and transcriptomics, fields that are revolutionizing our understanding of life at its most fundamental level. The additional objective was to increase awareness of the research that Botswana Institute for Technology Research and Innovation (BITRI) is currently undertaking in area of molecular biology as well as to educate them on the career opportunities available in the field of biotechnology.

Genomics: The Blueprint of Life

Genomics, which is defined as the study of an organism's complete set of Deoxyribonucleic acid (DNA), including all its genes, is more than just a discipline for understanding genetic diseases. It's a window into the blueprints of life. By decoding these genetic instructions, we're not only unravelling the secret of living organisms, but we are exploiting the potental of diagnosing and treating diseases with unprecedented precision, enhancing agricultural practices, conserving wildlife, and even solving crimes. The application of genomics in medicine is particularly transformative, offering hope for patients with genetic disorders through personalized medicine tailored to an individual's genetic makeup

Metagenomics: A Community of Genomes

While genomics focuses on the DNA of individual organisms, metagenomics broadens the lens to examine the collective genome of microbial communities found in natural environments. This approach has unearthed microbial inhabitants we never knew existed, many of which play critical roles in ecosystems, human health, and disease. Metagenomics opens up new avenues for understanding our planet's biodiversity, discovering novel enzymes for industrial applications, and even identifying antibiotic resistance patterns, which are crucial in our ongoing battle against infectious diseases.


Students paying attention during the presentation

BITRI made a presentation during a career fair organised by the UB Biological Sciences Department. The event is part of BITRI's stakeholder engagement orientation aimed at developing capacity in research development and innovation (RDI).

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Transcriptomics: The Dynamic Genome

Transcriptomics takes us into the dynamic world of gene expression, analysing the complete set of RNA transcripts produced by the genome under specific circumstances. This field gives us insight into how genes are turned on or off in response to various environmental conditions, shedding light on the complex regulatory mechanisms that underpin health and disease. In cancer research, for example, transcriptomics is being used to identify the gene expression profiles unique to different tumour types, leading to more targeted and effective treatments.

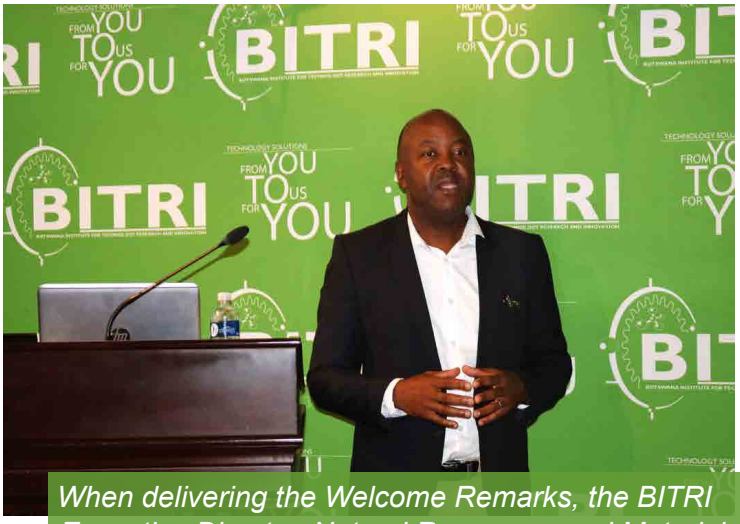
The Future Is Now

As we delved deeper into these topics, the potential of these genomic sciences became increasingly clear. They are not just academic disciplines; they are tools with the power to improve lives, protect our environment, and propel us into a new era of scientific discovery and medical innovation. The questions posed by the students reflected a keen understanding of the ethical, societal, and scientific implications, reminding us that with great power comes great responsibility

A Global Perspective

In Botswana, the integration of genomic technologies into healthcare and environmental conservation is still at its nascent stages. However, the enthusiasm and curiosity displayed by the students at the University of Botswana are indicative of a promising future where genomics could play a pivotal role in addressing some of our most pressing challenges, from combating infectious diseases to ensuring food security and preserving our natural heritage.As we stand on the brink of a genomic revolution, it's crucial that we continue to educate, innovate, and collaborate internationally. The journey into the genome, vast and intricate, promises to unveil mysteries of life that have puzzled humanity for centuries. For the students who joined me in this exploration, and for the global scientific community, the message is clear: the future of genomics is not just about what we can discover, but how we use that knowledge to make a difference in the world.

Royal Society of Chemistry Grant to Establish a Network for Nanofiber Based Research in Botswana



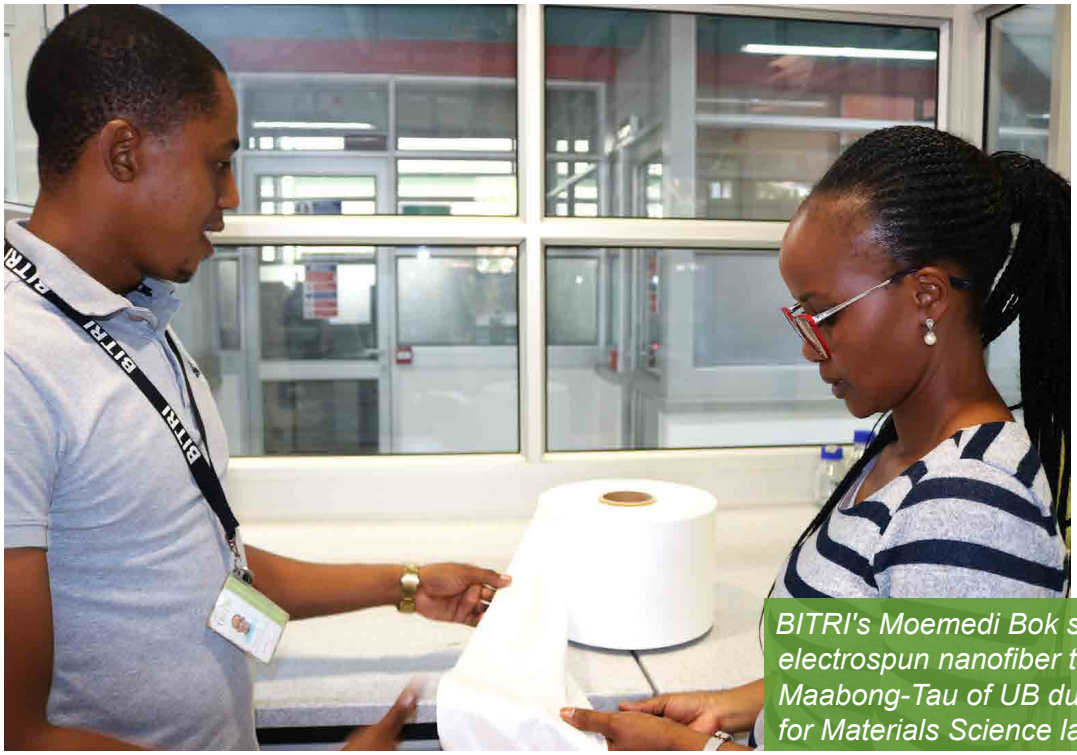
When delivering the Welcome Remarks, the BITRI Executive Director, Natural Resources and Materials Dr. Mataba Tapela emphasized the importance of establishing a research network as it allows for sharing resources and also helps with access to funding opportunities.

The Royal Society of Chemistry (RSC) awarded to Botswana Institute for Technology Research and Innovation (BITRI) a grant to conduct workshops and meetings aimed at establishing a network for electrospun nanofiber-based research in Botswana. The project entitled 'Towards Creation of a Network of Researchers for Electrospun Nanofiber-Based Products Development' was awarded £4875 for the proposed first phase. The two goals of the first phase of the project are to connect Researchers in Botswana as well as to connect the Botswana network to the global community of Researchers in electrospun nanofiber-based materials.The first workshop was held on the 21st of March 2024 at the BITRI headquarters. The aim of the workshop was to connect Researchers from BITRI, University of Botswana (UB), Botswana International University of Science and Technology (BIUST) and Botswana University of Agriculture and Natural Resources (BUAN) as a first step of building the network. In an effort to take a multidisciplinary approach to electrospun nanofiber-based research, the workshop participants were composed of experts in Chemistry, Biomedical Engineering, Physics, Mechanical Engineering, Materials Science and Nanotechnology Executive Director, Natural Resources and Materials Dr. Mataba Tapela emphasized the importance of establishing a research network as it creates a platform for sharing resources and attracting network focused funding opportunities notably he Ministry of Communications Knowledge and Technology supported National Research Fund.An overview of the program for the day was presented by Dr. Ipe Mavunkal including the thinking behind the project. the Ministry of Communications Knowledge and Technology supported National Research Fund.

An overview of the program for the day was presented by Dr. Ipe Mavunkal including the thinking behind the project. Dr Samuel Chigome then followed with a presentation on the principles of electrospinning, electrospinning facilities at BITRI and electrospun nanofiber-based product development. This was then followed by a tour of the laboratory scale and pilot scale electrospinning facilities at BITRI. The programme later focused on presentations by Researchers from the different institutions in Botswana.

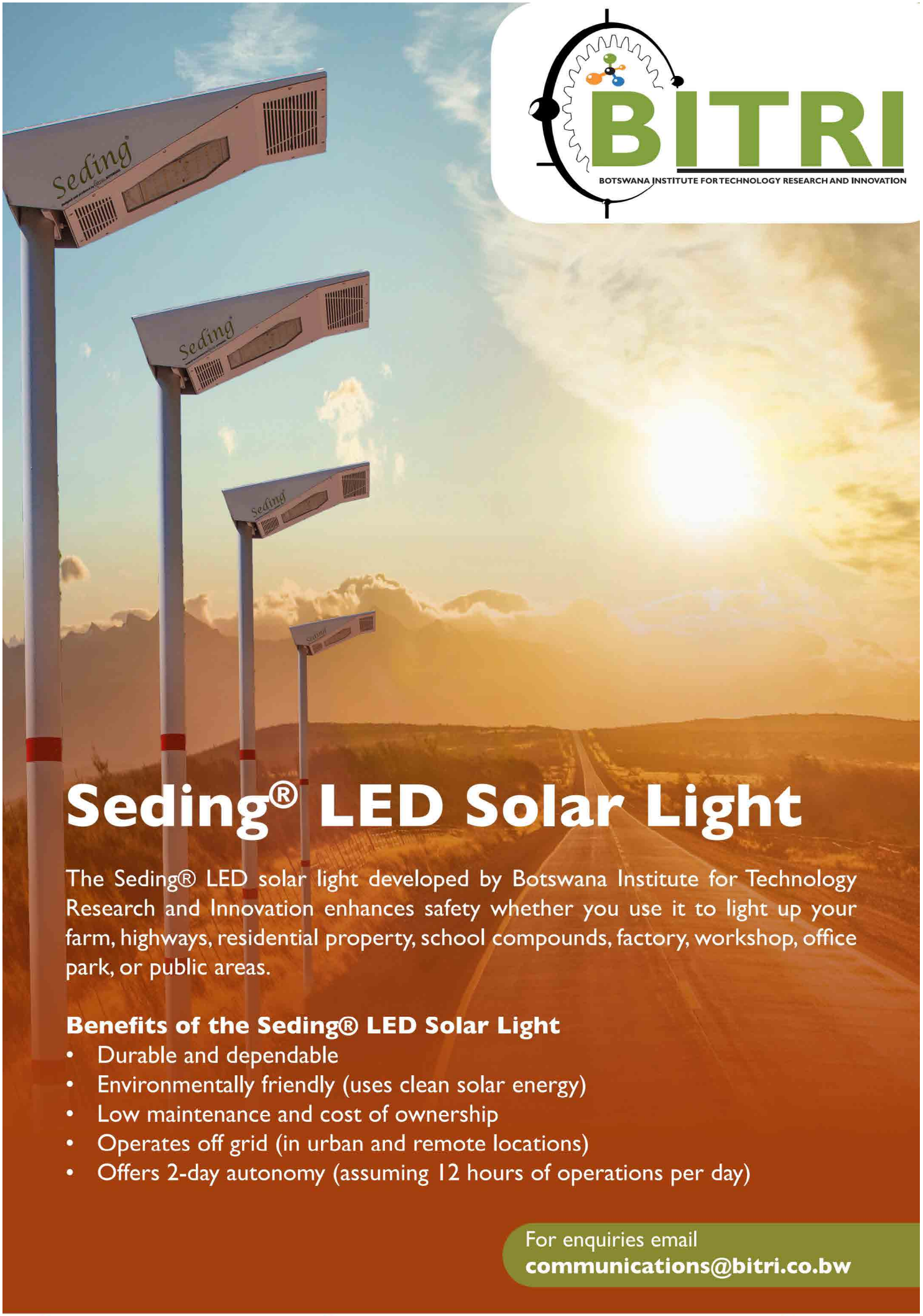
The presentations were then followed by a very productive discussion on possible areas of collaboration in electrospinning and other opportunities involving the broad area of materials science.

In his closing remarks, The Lead Researcher, Nanomaterials, Dr Maitshwarelo Matsheka outlined some key areas of synergy as a result of the network.



BITRI's Moemedi Bok showing a sample of electrospun nanofiber to Dr. Kelebogile Maabong-Tau of UB during a tour of the Centre for Materials Science laboratories

Participants listening to University of Botswana's Dr. Robert Batane's presentation titled 'Mechanical Behaviour of Submicron Grain Sized Nickel Under Axial-Torsional Cyclic Deformation'.



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