



Scholars in STEM



First International Conference of Scholars in STEM ICS-STEM 2025

2-3 April 2025

Virtual, Finland



ICS-STEM
2025

1st International Conference of Scholars in STEM

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About

Scholars in STEM is a registered non-profit and non-governmental organization based in Finland committed to empowering Afghan women and girls by providing access to mentorship, professional development programs, online education/training and opportunities to pursue higher education and careers in Science, Technology, Engineering, and Mathematics (STEM) fields mostly online. This platform is for all Afghan women and girls aged 18 and above. In Afghanistan, women and girls face significant challenges in accessing quality education, resources, and opportunities due to various socio-economic factors and systemic barriers. Furthermore, recent events, such as the Taliban's ban on women's rights to education and higher education, have exacerbated these challenges, threatening to derail progress made in advancing gender equality and women's empowerment in STEM. Despite their enthusiasm and passion for education and learning, they continually face obstacles that hinder their choices and career development.

Vision

Our vision is to create a future where Afghan women and girls are at the forefront of scientific innovation and leadership in STEM fields. Through empowerment, education, and equal opportunities, we envision a society where every woman has the tools and support to excel in STEM, driving sustainable development and societal progress in Afghanistan and beyond.

Mission

Our mission is to empower Afghan women and girls in Science, Technology, Engineering, and Mathematics (STEM) fields through education, advocacy, and opportunity. We are committed to fostering a supportive environment where every woman has equal access to STEM education, resources, and mentorship, enabling them to thrive and contribute to the advancement of society and sustainable development in Afghanistan.

General Information

ICS-STEM 2025 is a virtual conference designed to foster knowledge exchange and collaboration among researchers worldwide, including those from well-established research institutions and those from underrepresented or resource-limited regions in Science, Technology, Engineering, and Mathematics (STEM).

This event is free for all participants and has been organized to provide researchers and academics from low-income or underrepresented communities with the opportunity to present their work without financial constraints.



Welcome Message from the Conference Chair

Dear Participants,

On behalf of the organizing committee, it is our great pleasure to welcome you to the **First International Conference of Scholars in STEM (ICS-STEM-2025)**. We are excited to bring together brilliant minds from around the globe for this virtual event, where we will explore the latest innovations in science, technology, engineering, and mathematics. This conference serves as a unique opportunity to foster meaningful discussions, share knowledge, and build global connections that drive progress in STEM. We are honored to have esteemed speakers from various countries and institutions contributing their expertise to this platform, and we look forward to engaging presentations and insightful exchanges.

We look forward to welcoming you to this event. Beyond sharing your expertise, we hope you will take this opportunity to establish valuable connections and collaborations with fellow experts in your field.

On behalf of the organizing committee



Sweeta Akbari, Ph.D.
Conference Chair



Hanna Vuorenmaa, Ph.D.
Organizing Committee Member



Fahim Fayaz, Ph.D.
Organizing Committee Member

Message from the Founder and CEO of Scholars in STEM,

STEM has no gender; it only thrives through the contributions of all genders working equally within the field. True innovation and progress are achieved when every individual regardless of gender has equal opportunities to contribute and shape the future.

When we look around the world, we still see societies where gender equality has not been realized, such as Afghanistan. Ranked among the least developed in science. Ranked as one of the least developed societies in science, girls and women in this country are deprived of many basic human rights, including access to education and research. Girls beyond their teenage years are prohibited from attending schools and universities, severely restricting their opportunities for growth and advancement. Global engagement is urgently needed to help them learn, participate, and unlock their full potential to contribute to the global community.



Sweeta Akbari, Ph.D.
Founder and CEO
Scholars in STEM

Committees, Boards, and Support Team



Hassan Rahnaward Ghulami
PhD Candidate
University of Bologna, Italy



Marzia Hakimi, MSc
University of Alberta, Canada



Janne T. Koivisto, Ph.D.
Tampere University, Finland



Vijay Singh Parihar Ph.D.
Tampere University
Scholars in STEM, Finland



Farmanullah Nasiri, MASDP
Scholars in STEM, Finland

Sweeta Akbari, Ph.D. Conference Chair

Short Bio:

Dr. Sweeta Akbari is the founder and CEO of Scholars in STEM and a postdoctoral researcher at Tampere University. She is also a fellow of The Institute of International Education’s Scholar Rescue Fund (IIE-SRF) at this university in Finland. She holds a Ph.D. in chemical engineering and specializes in biomaterials, emulsion sciences, 3D porous materials, polymers, and bioactive compounds. Dr. Akbari has authored over 25 scientific articles and book chapters in high-impact journals and has presented at nearly 15 international conferences across Europe and Asia. She has delivered over 20 invited talks on STEM education globally, particularly advocating for women and girls in underrepresented communities. She has supervised several undergraduate students and secured multiple research grants, including a prestigious 2024 Jenny and Antti Wihuri Foundation grant. Beyond academia, she is dedicated to expanding education and research opportunities for women and girls in STEM, particularly in Afghanistan, through Scholars in STEM. Her mission is to bridge educational gaps and foster global scientific collaboration.



Sweeta Akbari, Ph.D.
Scholars in STEM
Conferecne Chair, Finland

Keynote Speakers



Professor Padmini Murthy
MD, MPH
New York Medical College
United States

Professor Padmini Murthy, MD, MPH, MS, FAMWA, FRSPH

Speech Title: The Role of STEM in advancing Women’s Global Health and Human Rights

Short Bio:

Dr. Padmini (Mini) Murthy is a globally recognized health professional in her roles as a physician and public health expert. Her research interests focus on women’s health, human rights, global health diplomacy, and AI in femtech. She is currently a Professor and the Global Health Director at New York Medical College School (NYMCS) and NYMC School of Health Sciences and Practice, USA. She also serves as Chair of the Intersectional Council of the American Public Health Association (APHA), past Chair of the International Health Section of the (APHA), and the Global Health Lead for the American Medical Women’s Association. Additionally, she is the NGO representative to the United Nations.

Dr. Murthy has worked as a consultant with the United Nations Population Fund and has been appointed as the co-focal point for the United Nations SDG 3 Hub at NYMCSHSP. She has worked with UN ambassadors, first ladies, and UN missions to promote women’s health globally, with local efforts in the Bahamas, Grenada, India, Liberia, Malawi, Nepal, and the Republic of Suriname.

Hanna Vuorenpää, Ph.D.

Speech Title: Cell and Tissue Engineering: A New Era of Organ-on-Chip Technology to Study Systemic Effects on the Human Body

Short Bio:

Dr. Hanna Vuorenpää is a cell biologist who earned her PhD from Tampere University, Finland. Her expertise encompasses cell and tissue engineering, with a focus on Organ-on-Chip technology, or microphysiological systems, for studying healthy and diseased human tissues. She views this innovative technology as a significant advancement towards replacing animal testing and as a valuable tool for examining systemic effects on the human body. In addition to her academic background, Dr. Vuorenpää has experience in quality management systems, including the validation of cell models in GLP and GMP laboratory settings within the pharmaceutical industry.



Hanna Vuorenpää, Ph.D.
Tampere University
Finland

Annina Rautalahti, Ph.D Researcher

Speech Title: Resilience and Mental Well-being

Short Bio:

Annina Rautalahti is a dedicated healthcare professional and entrepreneur with a Master's degree in Public and Global Health, currently pursuing a PhD in Social Psychiatry at Tampere University in Finland.

Annina has founded two tech startups focused on increasing social capital and strengthening social networks for families with small children. An advocate for human rights, Annina is committed to ensuring equitable access to education and healthcare opportunities for all.



Annina Rautalahti
Tampere University
Finland



Janne T. Koivisto, (Ph.D.)
Tampere University
Finland

Janne T. Koivisto, Ph.D.

Speech Title: Mechanics of Biomaterials

Short Bio:

Dr. Janne T. Koivisto is post doctoral research fellow working in the Biomaterials and Tissue Engineering Group of prof. Minna Kellomäki, affiliated with the Centre of Excellence in Body-on-Chip Research, in Tampere University, Finland. He received the Bachelor's and Master's degrees from the Tampere University of Technology in the field of materials science and engineering, and Doctor of Science (Tech.) degree from Tampere University in the field of biomedical engineering. He has spent post doctoral periods in the Microelectronics Research Unit at University of Oulu, Finland, and in the Bone Biology Group at Karolinska Institutet, Sweden. During his post doc abroad, he also conducted several research visits to the Applied Mechanics group at Karlsruhe Institute of Technology. He returned back to his alma mater in Tampere University after receiving the competitive Tampere Institute for Advanced Studies Fellowship. The research of Dr. Koivisto is focused on hydrogel biomaterials, especially on their use as 3D cell culture growth substrates for in vitro disease modeling applications. A large portion of the research is gaining better understanding of the materials science of hydrogels, including for example microstructural characterization and mechanics.

Mahrokh Avazpour, Ph.D.

Speech Title: Spectrally Efficient Optical Communication Systems using Frequency Comb Technology

Short Bio:

Dr. Mahrokh Avazpour earned her PhD in Applied Physics from University of Puebla, Mexico, specializing in the design of mode-locked fiber lasers for generating short pulses, particularly solitons. Awarded a Marie Skłodowska-Curie Actions co-fund Sparkle Fellowship, she currently conducts postdoctoral research at Dublin City University's Optical Communications Laboratory, focusing on optical frequency comb generation via fiber loop modulation. Her work includes international presentations, publications, book chapters, and gold medals at the national and International Invention Fair.



Mahrokh Avazpour, Ph.D.
Dublin City University
Ireland

Advanced human cell and tissue models in biomedical research and beyond

Hanna Vuorenpää

Faculty of Medicine and Health Technology, Tampere University, Tampere, Finland

Abstract

In medicine, human cell and tissue models are drawing increasing interest from academia and from the biomedical industry due to their capability to capture human physiology. Advanced cell and tissue models can be used to study human organ and tissue level functions in health and in diseased states in controlled and mechanistic manner. Key features in cell and tissue models include microenvironmental control and monitoring as well as high biological complexity of the target of interest. Beside basic research, cell and tissue models are important tools to assess the safety of compounds and efficacy of new drug candidates. They are increasingly used in personalized medicine applications and to replace animal experiments. Here, I present different areas of modern cell and tissue engineering and describe some of the essential building blocks to establish human cell and tissue models. I dive into developing microphysiological systems (1) and provide insights for the future with improved recapitulation of human physiology.

Keywords: Cells, Cell and tissue engineering, Biomedicine, Microphysiological systems

Reference:

[1] H. Vuorenpää, M. Björninen, H. Välimäki et al. (2023). Building blocks of microphysiological system to model physiology and pathophysiology of human heart. *Front Physiol* 14:1213959. doi: 10.3389/fphys.2023.1213959.

Mechanics of biomaterials

Janne T. Koivisto

Faculty of Medicine & Health Technology, Tampere University, Tampere, Finland

Abstract

Medical biomaterials are materials that are used in direct contact with live tissue, whether human or animal, in vitro or in vivo. In most applications, the mechanical properties are important for the proper function of the biomaterial or scaffold made out of the biomaterial. One of the biomaterial types gaining more and more attention is hydrogels, water-filled and crosslinked polymer networks that match well the extracellular matrix of human tissues. This presentation will cover the most common methods for mechanical characterization of hydrogel biomaterials in both macroscopic (or bulk) scale, as well as in the microscopic scale. Main focus is on three methods: 1) compression testing and related analysis methods, 2) rotational rheology, including confirming reliable data, 3) microrheology for analyzing hydrogel micromechanics and porosity in the cell-relevant microscale.

Keywords: Hydrogels, Rheology, Micromechanics, Compression testing

Acknowledgements:

I want to thank the Centre of Excellence in Body-on-Chip Research, funded by Research Council of Finland, and the Tampere Institute for Advanced Studies, for funding my research. I also thank all the co-authors of my scientific articles for all the work together. Professor Minna Kellomäki is especially thanked for support.

Cultivating a resilient mindset for success

Annina Rautalahti

Faculty of Medicine & Health Technology, Tampere University, Tampere, Finland

Abstract

Resilience is the key to navigating life's inevitable challenges, yet many struggle to bounce back from failure, rejection, and setbacks. In this keynote, we explore the practical tools needed to cultivate a resilient mindset, transforming obstacles into opportunities for growth. Drawing on logotherapy, a meaning-centered approach developed by Viktor Frankl, we will examine how individuals can harness purpose and inner strength to overcome adversity. Failure is often perceived as a roadblock, but it can be reframed as a stepping stone to success. By shifting our perspective, we learn that setbacks are not reflections of our worth but opportunities to refine our skills and strategies. This talk will introduce evidence-based techniques such as cognitive reframing, self-compassion, and adaptive goal-setting to help individuals develop mental toughness. Rejection, whether personal or professional, can feel like a devastating blow, but it does not define our potential. Instead, we can use it as a catalyst for redirection, uncovering new opportunities that align with our true values. Logotherapy teaches us that even in suffering, we have the freedom to choose our response. By embracing a sense of purpose and meaning, individuals can turn painful experiences into profound personal growth. Moreover, resilience is not just about enduring hardship but also about thriving despite it. The power of community, mentorship, and emotional agility plays a crucial role in fostering a mindset that sees challenges as temporary and surmountable. We will discuss how embracing failure as a necessary part of success can lead to greater innovation, confidence, and perseverance. The aim of this keynote is to leave attendees with actionable strategies to develop resilience, find meaning in adversity, and navigate life's uncertainties with confidence. Whether in academics, careers, or personal life, cultivating a resilient mindset is the foundation for long-term success and fulfillment.

Keywords: Resilience, Logotherapy, Cognitive reframing, Life challenges

Free space optical communication systems using frequency comb technology

Mahrokh Avazpour

Dublin City University, Glasnevin, Dublin 9, Ireland

Abstract

Optical frequency combs are analyzed in the context of using them for carrying data in optical fiber communication systems. Flat optical frequency comb (OFC) generation by fibre loop modulation is a technique used for the generation of stable and broadband optical frequency combs with equidistant frequency spacing [1, 2]. This method involves modulating an optical signal with a sinusoidal waveform and propagating it through a fibre loop. As the modulated signal continually passes through the modulator in the fibre loop, a comb-like spectrum is generated [3]. Fig 1 shows the simulation block diagram of the fiber loop modulation. A dual drive Mach-Zehnder Modulator (MZM) is driven with a 27 dBm signal to introduce phase modulation to the optical carrier from the laser. The new frequency components are generated by continually passing the signal through the modulator in the loop where the fundamental frequency of the loop is a subharmonic of the modulator drive frequency. In this set up a 50/50 optical coupler (OC) has been used to inject the seed laser to the loop cavity and half of the optical signal within the loop is extracted from the output of the OC, resulting in an optical frequency comb. The total power launched into the loop is 13 dBm and a Semiconductor optical amplifier (SOA) with 11 dB gain is used within the loop to compensate for the loss of the OC and MZM. The mode-locked oscillation in the loop can be controlled by adjusting the gain balance of amplifiers and the frequency of the sine wave generator.

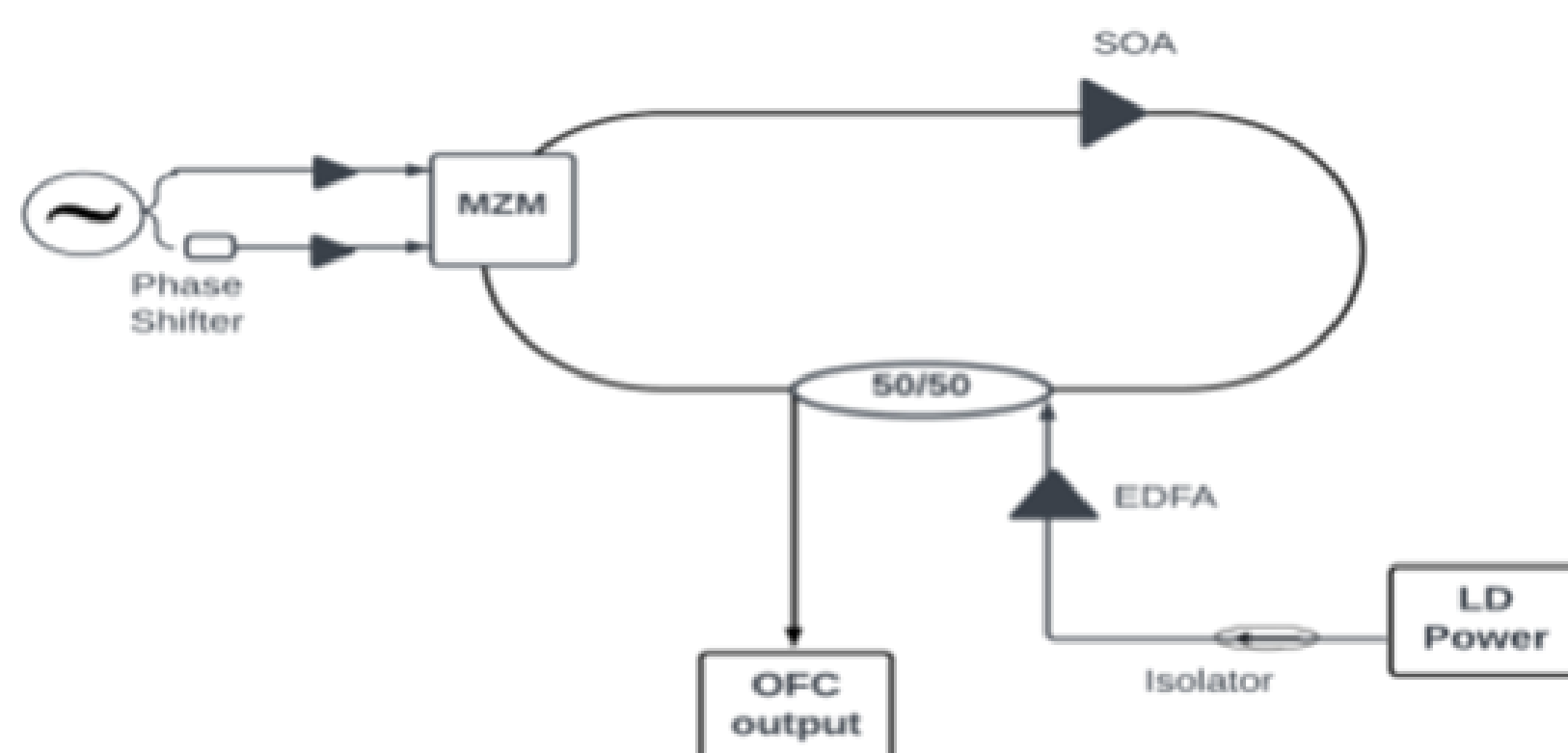


Fig. 1. Fiber loop modulation setup. MZM: Mach-Zehnder Modulator; SOA: Semiconductor optical amplifier; LD: Laser Diode, OFC: optical frequency comb

Transmission of Optical Frequency Comb over FSO

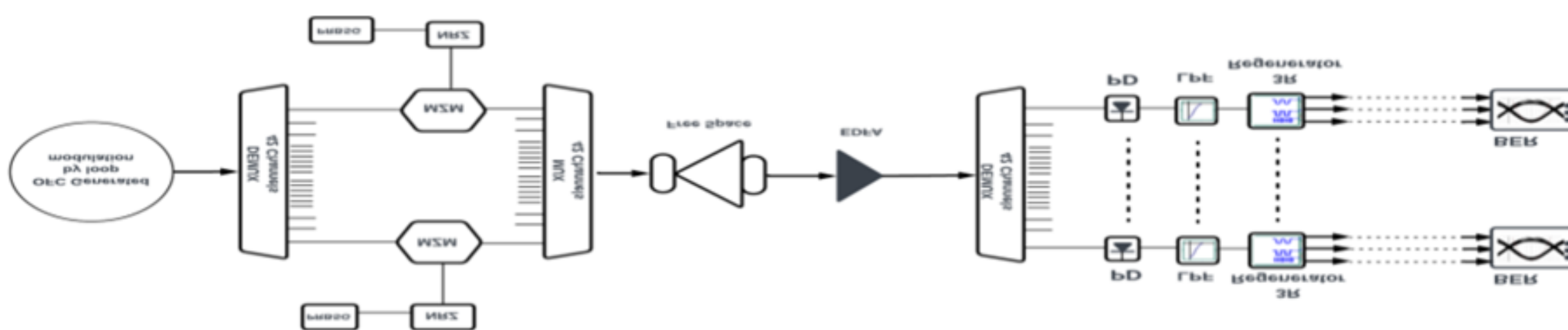


Fig. 2. Setup block diagram for data transmission using Optical Frequency Comb over FSO.

The OFC source is demultiplexed using 42-channel demultiplexer with 30 GHz filter bandwidth.

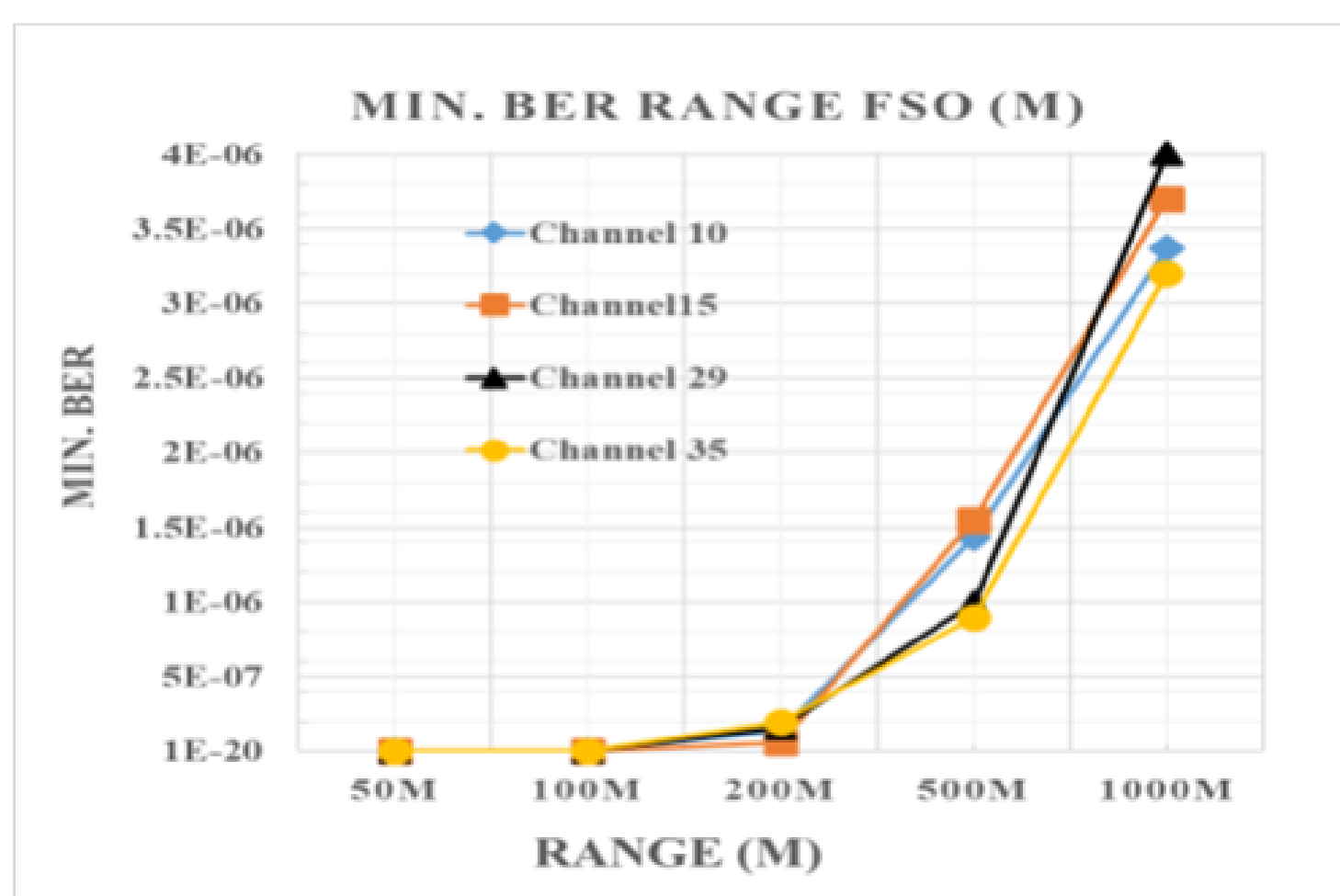


Fig. 3. Change of BER with different range of FSO.

The proposed OFC design produces 42 channels with channel spacing of 50 GHz. The generated comb is spread over approximately 2 THz. A NRZ data at a rate of 22 Gbps has been successfully transmitted for each comb line over 1 km FSO distance using the multi wavelength comb source. The transmitted data has bit rate errors below 4×10^{-6} , for all channels transmitted over 1km FSO distance, which indicates that our proposed system is suitable for high-capacity FSO communication systems

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Synthesis of chitosan nanoparticles encapsulating systemic-acquired resistance (SAR) protein elicitor for uptake in *Carica papaya* L. leaves

Nur Balqis Zamri and Mas Jaffri Masarudin

*Institute of Nanoscience and Nanotechnology, Universiti Putra Malaysia, 43400
Serdang, Selangor, Malaysia*

Abstract

Carica papaya L. is a popular tropical fruit enjoyed worldwide and holds significant economic value in Malaysia. Unfortunately, the emergence of papaya dieback disease, caused by the phytopathogenic bacterium *Erwinia mallotivora*, has led to a considerable decline in market revenue. The discovery of effector proteins secreted by *E. mallotivora* has opened new possibilities for disease management, as these proteins can rapidly trigger defense mechanisms such as systemic acquired resistance (SAR) against pathogen attacks. However, the inherent instability of protein formulations can reduce their efficiency and effectiveness. Nanobiotechnology offers a promising solution by encapsulating these biological compounds within chitosan biopolymer, enhancing their stability and delivery to crops. Chitosan was chosen for its favorable characteristics, including biocompatibility, biodegradability, antimicrobial properties, and its inherent ability to boost plant immune responses. Therefore, this study aimed to develop, characterize, and evaluate a chitosan nanoparticle (CNP)-based delivery system for transporting effector proteins into papaya leaves. To achieve this goal, the study involved the synthesis of recombinant HrpN protein, encapsulation within CNPs, physicochemical characterization, in vitro HrpN release profiling, fluorescence-based uptake assessment in plants, and toxicity testing using zebrafish embryos. A specific Type III effector from *E. mallotivora*, known as HrpN, was produced as a recombinant protein and encapsulated within chitosan nanoparticles via the ionic gelation method. The optimized CNP-HrpN formulation generated spherical nanoparticles with high encapsulation efficiency (>80%) and good colloidal stability, characterized by a particle size of 106.34 ± 2.053 nm and a low polydispersity index of 0.188 ± 0.011 . Infrared spectroscopy confirmed the successful incorporation of bioactive compounds within the nanoparticle matrix. In vitro release analysis demonstrated a sustained HrpN release over 72 hours, while fluorescence imaging showed the accumulation of CNP-HrpN in papaya leaves 24 hours after delivery. Toxicology evaluation revealed that CNP-HrpN posed no toxicity risks to zebrafish embryos. This study successfully developed and characterized HrpN-encapsulated chitosan nanoparticles using the ionic gelation technique, demonstrating sustained protein release and successful plant uptake. The results suggest that CNP-HrpN could serve as a potential plant defense delivery system, warranting further in vivo testing under greenhouse conditions to confirm its efficacy. This research paves the way for developing biocompatible tools to enhance plant disease management in the future.

Keywords: Chitosan nanoparticles, Papaya dieback disease, Systemic acquired resistance

Acknowledgements:

We would like to acknowledge Malaysian Agricultural Research and Development Institute (MARDI), Malaysia for the Internal Development Fund: 2100300405001-2019-C and Universiti Putra Malaysia for the collaboration and consultation.

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Assessing impacts of human development index and climate change on food availability in Afghanistan

Atefa Hussaini, Narges Teimory, Shahla Sharifi , Alema Hussaini

Baghlan University, Pul-e-Khomri, Baghlan Province, Afghanistan

Abstract

Human Development Index (HDI) and the developed human, as critical environmental factors, can play a fundamental role in enhancing food production, maintaining resource sustainability, and mitigating climate change. This study aims to analyze the intricate relationship between food production, HDI, and climate change using the VAR model. The long-term relationship analysis reveals positive effects of precipitation, temperature, and HDI on food production. Through the application of the Johansen Cointegration test and the validation of long-run relationships, the results indicate that a 1% increase in HDI leads to a 1.5-fold increase in food production. Moreover, climate change exhibits a six-fold impact on food production. Additionally, the variance decomposition analysis indicates that HDI, starting from the second time period, generates a cumulative and escalating effect on food security. Based on the findings of this study, HDI emerges as a pivotal factor that can facilitate the path toward sustainable food security and the advancement of related technologies. Thus, it is crucial to integrate HDI considerations into policymaking related to food resources and climate change.

Keywords: Human Development Index, Climate change, Food availability, Afghanistan

Pioneering light gauge steel construction in Afghanistan: A case study of Raqim construction and project's pilot initiatives in Badakhshan province

Ahmad Seeyar Fahim

Raqim Construction and Project Services, Kabul, Afghanistan

Abstract

The article highlights the light gauge steel (LGS) technology that Raqim Construction and project initiated to bring in Afghanistan using the FRAMECAD F450T machine as well as the technology which was the pioneer for the application of this technology to Afghanistan. The technicians from FRAMECAD could not reach Afghanistan due to the security concern, which resulted in the author to get training in Dubai. To solve the problem, they simulated some examples like FRAMECAD structure, detailer, and production accompanied by the author company to order the machine which the company co-operated in Afghanistan. Based on the research, it was found that out of seven pilot projects which had been made, produced, and installed in Badakhshan Province a place that is at a high altitude and has a lot of seismic activity. The study intends to elaborate on the problematic issue with LGS technology including the disassembly and assembly of big LGS parts, logistics bottlenecks, regulatory barriers, and environmental issues. The paper has shown LGS to be not only a green cost-effective construction option, but it also has been found to be highly viable in difficult geographies such as Afghanistan. By the reason of overcoming the hardships and demonstrating that LGS can be used in difficult terrains, the paper highlights that LGS is a construction method that has the potential to revolutionize such limited areas. The findings suggest that LGS can be used as a cost-effective, resistant material in contrast to traditional construction methods, and environmental pressures can be lowered by green construction. The study pinpoints that the LGS technology application in harsh terrains is just a beginning thus it may attract different innovators in construction sectors in the future.

Keywords: Light gauge steel, FRAMECAD F450iT, Badakhshan province, Seismic resistance, Remote construction

Acknowledgements:

The authors thank FRAMECAD for remote technical support and training resources and local Badakhshan communities for their collaboration.

Sustainable utilization of beetroot pomace in biscuit formulation: Nutritional enhancement and quality assessment

Sana Zaheer, Abeera Moin, Syeda Hiba Ali, Sana Qasim

*Department of Food Science and Technology University of Karachi, Karachi 75270,
Sindh, Pakistan*

Abstract

Food processing by-products represent an underutilized resource with significant potential for value addition. This study explores the incorporation of beetroot pomace flour (BPF), a fiber- and antioxidant-rich by-product of juice extraction, into biscuit formulations to enhance nutritional quality while minimizing food waste. Biscuits were developed with varying concentrations of BPF (10%, 15%, and 20%) and analyzed for compositional, rheological, physicochemical, and sensory attributes. The inclusion of BPF significantly influenced moisture, ash, fiber, and protein content, with an observed increase in fiber and ash, indicative of improved nutritional value. Rheological assessments showed modifications in dough consistency and water absorption due to the hydrophilic nature of BPF. Post-baking characteristics, including weight loss, spread ratio, color analysis, and alcoholic acidity, were evaluated, demonstrating that higher BPF levels reduced biscuit spread and altered color intensity due to the natural pigments in beetroot. Sensory evaluation revealed that biscuits with 10% BPF achieved the highest acceptability in terms of color, aroma, flavor, and texture, balancing nutritional enhancement without compromising sensory appeal. This study highlights the potential of BPF as a functional ingredient in bakery products, promoting sustainability by valorizing food industry by-products. The findings support the feasibility of BPF incorporation in commercial biscuit production, providing an innovative approach to nutrient enrichment and waste reduction. Further investigations into shelf-life stability will facilitate broader adoption of such sustainable food solutions.

Keywords: Beetroot pomace, Nutritional quality, Food waste, Functional ingredient, Techno-functional properties

Enhancing WIFI and Environmental Sustainability with the Artificial Tree Model: A Genetic Programming Conceptual Framework for FSS Technology

Sarah Rashidi

Lebanese University, Beirut, Lebanon

Abstract

The rapid growth of wireless technologies alongside increasing environmental concerns demands innovative solutions that merge technological advancement with sustainability. This paper introduces a conceptual Artificial Tree Model aimed at simultaneously addressing environmental issues, particularly CO₂ absorption, and enhancing WIFI signal quality. At the core of this model is frequency selective surface (FSS) technology, capable of selectively filtering frequencies to allow optimal WIFI transmission. The primary objective of this research is to validate the conceptual integration of FSS technology within a multifunctional, solar-powered artificial tree design, optimized through genetic programming. This advanced computational technique systematically evaluates and refines design variables, including layer count, spacing, thickness, and material selection. To assess the viability of our model, multiple simulated experiments were conducted, achieving a notable fitness score of 90%, indicative of an optimal balance between environmental benefits and wireless performance. Our findings underscore genetic programming's superiority over traditional optimization methods, showcasing its effectiveness in navigating complex design spaces. Additionally, sensitivity analyses demonstrated the critical role played by parameters such as population size, mutation rate, and crossover probability, which significantly influence the quality of the FSS configurations. Conclusively, this conceptual study provides robust evidence supporting the integration of genetic programming and FSS technology in developing multifunctional structures that simultaneously enhance WIFI connectivity and promote environmental sustainability. Future research directions include practical implementations of the proposed model in realistic environments, extensive evaluations with broader datasets, and scalability studies targeting urban sustainability solutions.

Keywords: WIFI generation, Artificial tree model, Genetic programming, Frequency selective surfaces

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Application of artificial intelligence in mapping oil and gas fields in northern Afghanistan

Kongul Qarizada

Department of Oil and Gas/Faculty of Geology and Mines/Kabul Polytechnic University, Afghanistan

Abstract

The subject of the research is the Application of artificial intelligence in mapping oil and gas fields in northern Afghanistan. Technology is a force that has caused enormous change and transformation in various scientific fields, especially engineering. Oil & gas field serving research with the help of various geological, geophysical and drilling methods (geological mapping, structural geology, geomorphology, drilling of wells) and other related works. Oil and gas field mapping in northern Afghanistan is an important and complex process in serving research. In order to achieve greater accuracy or resolution, cost reduction and time management, it is best to use other mapping methods. The research methodology of this scientific article involves collecting field data, utilizing reliable scientific and library sources, and compiling the findings based on credible studies from university research centers in the field of oil and gas. The aim of this research is to discover favorable oil and gas structures using surveying methods and modern technology. Geological, geophysical, and drilling studies have been conducted in most parts of northern Afghanistan by foreign and Afghan specialists in different areas and on different scales. Oil and gas fields in the field of research face various challenges, including Lack of access to advanced or modern technologies for Preliminary Survey, exploration, and extraction, Finance and investment are among the research problems. Main section of serving in the oil & gas industry, geological survey, geophysical survey, topographic survey, well serving and facility and pipeline surveying. These surveys help optimize exploration, drilling, and production efficiency while minimizing risks and costs. Artificial intelligence (AI) has proven to be a true enabler for oil and gas projects by offering numerous applications. Little research has been done in the northern part of Afghanistan. Therefore, it can be said that with the help of this new technology, can find new structures for oil and gas fields. Most areas in the northern part of Afghanistan remain unexplored. Research findings on the effectiveness of AI in the oil and gas sector, especially oil and gas field mapping, usually include scientific results, empirical data, and practical comparisons between traditional methods and AI-based methods. Research findings can be categorized into several main axes: Increasing accuracy, reducing costs, and accelerating the process of mapping oil and gas fields.

Keywords: AI, Geological, Geophysical, Survey, Geomorphology

The Impact of Humanitarian Leadership on Community Resilience with the Mediating Role of Stakeholder Engagement in Camps in Kabul, Afghanistan

Mohammad Abid Qayumi

Faculty of Business Administration, Kardan University, Kabul, Afghanistan

Abstract

This research explores the role of humanitarian leadership in enhancing community resilience, with a specific focus on how stakeholder engagement mediates this relationship within the camps and informal settlements in Kabul, Afghanistan. As displacement remains a pressing challenge in the Afghan context, the study seeks to understand how leadership behaviors, strategies, and engagement mechanisms can strengthen the adaptive capacities of affected communities. The study follows a quantitative research design, adopting a positivist philosophy and a deductive approach. Structured questionnaires were distributed to 378 participants across 10 major humanitarian organizations working in Kabul's camps. A stratified random sampling technique was used to ensure diverse representation, and the data were analyzed using regression analysis to examine the effects of leadership and stakeholder engagement on resilience outcomes. The findings indicate a positive and statistically significant relationship between effective humanitarian leadership and community resilience. Leaders who demonstrate participatory, inclusive, and empathetic leadership styles contribute to stronger community trust, improved resource management, and enhanced social cohesion. Moreover, stakeholder engagement emerged as a key mediating factor, enabling more inclusive decision-making, fostering community ownership, and ensuring context-specific interventions. The study concludes that humanitarian leadership, when combined with active and meaningful stakeholder participation, can significantly improve the resilience of displaced communities. It highlights the need for leadership development, participatory planning, and stronger coordination mechanisms within the humanitarian architecture of Afghanistan. The results offer practical insights for humanitarian actors aiming to build sustainable, community-driven solutions in crisis-affected environments.

Keywords: Humanitarian leadership, Community resilience, Stakeholder engagement, Displacement, Kabul camps



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