

NAM

S&T Newsletter



A Quarterly of the
Centre for Science and Technology of the Non-Aligned
and Other Developing Countries (NAM S&T Centre)

VOL. 34, No. 3
OCTOBER - DECEMBER 2024

FROM THE DG'S DESK

Greetings and best wishes to all our Esteemed Readers for a joyful and prosperous New Year 2025!



As we approach the close of another successful quarter, I am pleased to share with you the highlights of the activities and initiatives that have taken place at the NAM S&T Centre during October to December 2024. This has been a period of significant growth, collaboration and unwavering commitment to our mission of promoting scientific excellence and sustainable development in the Global South, while concurrently fostering stronger South-South and North-South relations.

The Centre extends warmest welcome to its new President - Dr. The Honourable Kaviraj Sharma Sukon, PFHEA, Minister of Tertiary Education, Science and Research, Government of Mauritius.

A significant event during this quarter was the International Workshop on "Patenting for Economic Growth: Opportunities and Challenges" held virtually during October 24-25, 2024. This Workshop brought together experts from across our Member States to explore the intersection of intellectual property and economic development.

On the publication front, the Centre has released a Fact File on "Lightning". I believe that this Fact File will provide valuable insights and foster greater understanding of the multifaceted challenges posed by Lightning.

Additionally, we are delighted to announce that a multilateral collaborative project on "Climate Resilient Agriculture in the Global South: Adaptation & Mitigation Strategies and Human Resource Development" has been approved by the G-77 Secretariat at the United Nations. This significant project reflects the growing recognition of the Centre's role in addressing climate change challenges and fostering sustainable agricultural practices in the Global South.

In this issue of the Newsletter, you will also find updates on key MoUs signed by NAM S&T Centre for collaboration with several esteemed organizations such as NAM CSSTC (Indonesia); ZMT (Germany); JSS AHER (India) and JSS STU (India) which continue to strengthen our network of like-minded institutions and foster cross-border scientific exchanges.

Our Centre also welcomed distinguished visitors from various countries, which have opened doors for further collaboration, strengthening our efforts to support scientific progress and innovation, especially in the developing nations.

Looking forward, we are thrilled to announce the upcoming International Workshop on "Food, Water, Energy Nexus & Sustainability" scheduled for February 20-21, 2025, in El-Ain El-Sokhna, Egypt. This Workshop aims to explore the interconnectedness of these essential resources and the role of sustainable practices in achieving global Sustainable Development Goals (SDGs).

We also remain committed to advancing our Fellowship Programmes, continuing to offer unique opportunities for researchers and contribute to the scientific community from the Global South.

As we prepare to launch new collaborative ventures and a variety of scientific programmes in the near future, we encourage you all to take advantage of these opportunities. Thank you for your support and we look forward to a productive and impactful 2025.

Happy Reading!

Amitava Bandopadhyay
(Amitava Bandopadhyay)
Director General

Centre Organised

**International Workshop on
Patenting for Economic Growth:
Opportunities and Challenges**
Mauritius, 24-25 October 2024
[Virtual Mode]

In today's global economy, characterized by rapid technological advancements and interconnectedness, patents have become essential tools driving innovation and enhancing economic growth. Patents represent legal protections issued by governments to inventors and creators, granting them exclusive rights to their inventions for a specific period. The potential of patents to drive technological progress and economic prosperity in the Global South cannot be underestimated.

By understanding the complexities of patenting within diverse socio-economic contexts, stakeholders can strategically leverage patents to open new pathways for innovation and economic growth. This entails not only strengthening intellectual property frameworks and improving legal certainty, but also fostering a culture of innovation that supports sustainable economic growth.

In order to deliberate on various issues regarding the importance of Intellectual Property Rights (IPR) and Patenting for economic development, the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi in partnership with the Ministry of Education, Tertiary Education, Science & Technology (MoETEST), Phoenix, Republic of Mauritius organized an International Workshop on 'Patenting for Economic Growth: Opportunities and Challenges' during **October 24-25, 2024 in Virtual-Mode.**

The Workshop aimed to foster an understanding of the role of patents to accelerate economic development, empower local innovators and sustain economic growth. It also underscored the integration of patent strategies into broader economic agendas.

Altogether 52 experts and professionals from 11 countries participated in the Workshop which was conducted over two days, and the proceedings were divided into - an Opening Session, 2 Special Invited Lectures, 4 Technical Sessions, a Panel discussion and a Closing Session.

(Contd. from Page 1 - Intl Wkshop on Patenting for Eco. Growth.....)

The Opening Ceremony was initiated by the Master of Ceremony, Ms. Carole Ricco, Ag. Deputy Permanent Secretary, MoETEST, Mauritius who welcomed and thanked Mrs. Sandrine Valère, Ag. Senior Chief Executive, MoETEST, Mauritius, and President, NAM S&T Centre Governing Council; Mr. Gulshan Ramrekha, Acting Permanent Secretary of MoETEST; Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre, India; Mr. Vedanand Bhurosah, Assistant Director, Tertiary Education and Scientific Research, MoETEST; representatives of the NAM S&T Centre Secretariat, India; invited speakers; distinguished delegates and other participants for sparing their valuable time to join this important virtual workshop.

Mr. Vedanand Bhurosah, Assistant Director, Tertiary Education and Scientific Research, Ministry of Education, Tertiary Education, Science and Technology of Mauritius welcomed the invited Chief Guest, speakers and participants from various NAM Member and other developing countries, colleagues from the Ministry, and online-invited participants and explained the background and objectives of the Workshop and various topics to be covered during the two days.

In his Opening remarks, Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre welcomed the Chief Guest, distinguished Keynote Speakers, Guests & Special Invitees, participants from various NAM and other developing countries and local participants from Mauritius to the Workshop. He thanked the Government of Mauritius, specifically Mrs. Sandrine Valère, President, NAM S&T Centre Governing Council and Ag. Senior Chief Executive, MoETEST, and other officers of MoETEST and the entire team of MoETEST for the admirable job of shouldering the responsibility of coordination and day-to-day work in organising this Workshop on behalf of the Government of Mauritius. He gave a brief overview of the background, objectives and activities of the NAM S&T Centre He highlighted that the Centre aims at promoting South-South Cooperation in Science and Technology for collective self-reliance of the developing countries; with a special focus on helping them to achieve the Global Sustainable Development Goals-2030.

This was followed by the Inaugural Address by Mrs. Sandrine Valère, who welcomed the participants. She mentioned that the theme of the workshop is timely and relevant, and as the countries are increasingly moving towards a knowledge-based economy, the role of intellectual property, and patents in particular, has never been more significant, since patents are the engines that fuel innovation, and innovation, in turn, drives economic growth.

The Inaugural Session was followed by two Special Invited Lectures. First Special invited lecture entitled *'International Collaboration for Patent Enforcement in the Global South'* was given by Dr. Sharizad Dahlan, Director, International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC) – UNESCO, Malaysia. In her presentation, she explained in detail about the role of patents as tools for innovation and development. She also highlighted the importance of strategic approaches for enhancing patent enforcement through collaboration using case studies and real-world examples and shared recommendations for policymakers and IP stakeholders in the Global South.

Second Special invited lecture entitled *“Legal Strategies for Commercialisation and Technology Transfer of Patented Innovations”* was delivered by Mr. Sivaramen Subbarayan, Legal Affairs Director, University of Mauritius, Mauritius. He discussed the role of law in commercialisation and technology transfer, highlighting how legal frameworks are crucial in facilitating the transfer of patented innovations from research to market.

There were four technical sessions and during two days, 3 Keynote Lectures were delivered and 12 paper presentations were made on the potential of patents to drive technological progress and economic prosperity in the Global South.

Four Technical sessions were: **Role of Patents in Fostering Economic Growth: An Overview; Challenges and Opportunities in Implementing Patent Systems; Commercialization and Technology Transfer; Strategies for Successfully Bringing Patented Innovations in the Market and Policy Development for IP & Economic Growth and International Collaboration.** These sessions were respectively chaired by Mr. Sivaramen Subbarayan, Legal Affairs Director, University of Mauritius, Mauritius, Dr. Suryamani Tripathi, Global Head (Legal Services), ICRISAT, Hyderabad, India, Dr. Fahim Ashraf Qureshi, Senior Manager, Office of Research, Innovation and Commercialization, COMSATS University Islamabad (CUI) , Pakistan and Dr. Shailaja Donempudi, Chief Scientist, Chair, Business Development & Research Management, CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad , India.

Three Keynote lectures during technical sessions were delivered by Mr. Ranjive Beergaunot, Acting Director, Industrial Property Office of Mauritius, Ministry of Foreign Affairs, Regional Integration and International Trade, Mauritius; Dr. Nitin Kumar Gopaul, Research Coordinator, Mauritius Research and Innovation Council, Mauritius and

New President of NAM S&T Centre

NAM S&T Centre Welcomes its New President



The NAM S&T Centre Secretariat extends its warmest welcome and best wishes to **Dr. the Honourable Kaviraj Sharma Sukon**, PFHEA, Minister of Tertiary Education, Science, and Research, Government of Mauritius, who has graciously assumed the esteemed role of the new President of the 16th Governing Council (GC) of the NAM S&T Centre in his ex-officio capacity.

Dr. the Honourable K. S. Sukon, Minister of Tertiary Education, Science, and Research, is a Principal Fellow of the Higher Education Academy (UK) and the Founding Director-General of the Open University of Mauritius (OU). He established OU in July 2012, transforming it into a dynamic, ISO-certified institution. By October 2024, under his strategic leadership, OU had surpassed 13,000 learners, secured its position as Mauritius's leading university in enrolment, and achieved full financial

independence—a remarkable achievement reflecting his unwavering dedication to innovation and excellence in higher education.

Dr. Sukon has been the Second Vice-President of the African Council of Distance Education, and as the Chairman of the Mauritius Research and Innovation Council, he led the launch of the first Mauritius nano-satellite and signed the agreement for the second one. He was also a Member of the Board of the Financial Services Institute Ltd. During his first job at the University of Mauritius [1994-1998], he developed the first local distance education manual in 1996. Then, he moved to the Mauritius Examination Syndicate [1998-2005], where he started marking the first CIE international paper in Mauritius in 1999. He then moved to the Human Resource Development Council [2005-2012], where he developed the first Human Resource Development Plan for Mauritius. His past leadership roles include chairing the Mauritius College of the Air and the Mauritius Museums Council, with esteemed tenures at the level of the Senate of the University of Mauritius and the Academic Council of the University of Technology Mauritius. Additionally, he is an Honorary Affiliate at the Imperial College London. He is a Member of the Editorial Board of the Journal of Learning for Development and the Symbiosis International Research Journal on Online & Distance Learning.

His contributions to academia extend internationally to consulting for prominent organisations such as ADEA, UNESCO, ILO, and UNDP. He has prepared “The Peer Review Report” on Educational Reforms in Mauritius, 2000-2005; UNESCO National Education Support Strategy (UNESS) for Mauritius in 2010; and the National Employment Policy for Mauritius in 2011. Dr Sukon's scholarly pursuits led to the development of a new mathematical model called the Two-Parameter Alternative Group Explicit Method. He has also coined the term "Blearning" to signify the cohesive nature of blended learning. His acclaimed 'Practical Teaching and Blearning Model' is published in the impact factor journal named 'Ubiquitous Learning: An International Journal'.

(For his complete CV, please visit: www.namstct.org).

(Contd. from Page 2 - Intl Wkshop on Patenting for Eco. Growth.....)

Dr. Suryamani Tripathi, Global Head (Legal Services), ICRISAT, Hyderabad India. They respectively delivered lectures on: *Country Report, IP office of Mauritius*”, “*The Role of the Mauritius Research and Innovation Council in Promoting Innovation and Intellectual Property Rights*” and “*Innovation Policy and International Collaboration to Promote Patenting*”.

There were twelve papers presentation from seven countries. Two papers from India were entitled “*The Interplay between Patenting and Publishing: A Case Study of Academia-Industry Collaborative R&D Project*” presented by Dr. Parul Sahu, Scientist, Salt and Marine Chemicals Division, CSIR – Central Salt & Marine Chemical Research Institute (CSMCRI), Bhavnagar, Gujarat and “*Innovative Strategies for Effective Out Licensing of Patents in Government R&D Institutions: Case Study of CSIR-IICT*” presented by Dr. Shailaja Donempudi, Chief Scientist, Chair, Business Development & Research Management, CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad, Telangana.

Mr. Prio Adi Ramadhani, IP Analyst, Reviewer, Drafter, QC, National Research and Innovation Agency (BRIN) from Indonesia presented a paper titled “*Evaluating Chat GPT's Responses on Patent Registration in Indonesia: A Focus on Computer Implemented Inventions*”

One of the three papers from Malaysia was “*Accelerating High Value Innovation with TRIZ Patent Literature Review Methodology*” presented by Prof. Dr. Zulhasni Abdul Rahim, Senior Lecturer, Universiti Teknologi Malaysia and the second paper “*Attaining a Productive Structure for Technology: The Bayh-Dole Effect on University-Industry-Government Relations in Developing Economy*” was given by Mrs. Marsiti Binti Md Salmin, Patent Examiner, Intellectual Property Corporation of Malaysia. Another presentation from Malaysia entitled “*Attaining a Productive Structure for Technology: The Bayh-Dole Effect on University-Industry-Government Relations in Developing Economy*” was by Mrs. Marsiti Binti Md Salmin, Patent Examiner, Intellectual Property Corporation of Malaysia.

Dr. Nassirah Laloo, Senior Lecturer, University of Technology from Mauritius made a presentation on “*Creative Technologies for Sustainable Innovation*”.

From Nigeria, the paper “*Patent and Economic Development in Nigeria: Prospects and Challenges*” was presented by Dr. Fortune Miebaka Alabi, Deputy Director, Laboratory Service, Raw Materials Research and Development Council (RMRDC), Abuja.

Dr. Fahim Ashraf Qureshi, Senior Manager, Office of Research, Innovation and Commercialization, COMSATS University Islamabad (CUI) from Pakistan gave a presentation on “*Value of IP in a Knowledge-based Economic System*”.

There were two technical papers from Sri Lanka. A paper entitled “*Transformative Trends in Potato Farming: Analyzing Technical Efficiency Evolution via Mechanization (1999-2019)*” was presented by Mr. Kosgahahene Gedara Chamara Dushyantha Bandara Wijesinghe, Assistant Director of Agriculture, Socio Economic and Planning Centre, Department of Agriculture and the other paper titled “*Bridging Academia and Industry: A Strategic Approach to Technology Transfer and Intellectual Property Management at USJ*” was presented by Ms. Laksarani Kulasekara, Research Assistant/Patent Officer, Tech Transfer Office, University of Sri Jayewardenepura.

Towards, the end of the Workshop, a Panel discussion was organized comprising of six experts: Dr. Sharizad Dahlan (Malaysia), Dr. Nitin Kumar Gopaul (Mauritius), Dr. Suryamani Tripathi (India), Dr. Shailaja Donempudi (India), Dr. Fahim Ashraf Qureshi (Pakistan) and Ms. Laksarani Kulasekara (Sri Lanka). The session was moderated by Mr. Sivaramen Subbarayan (Mauritius). During the panel discussion, extensive deliberations were held, particularly on enhancing the commercialization of patents through effective policies and legal provisions. The discussion underscored the complexity of integrating research funding with the patenting process and the role of external bodies in providing frameworks for universities. The need for international and South-South collaborations to enhance innovation and knowledge sharing, suggesting collaborative patenting and licensing as potential solutions was highlighted. Discussion concluded by emphasizing that the Artificial Intelligence (AI) and digital tools should be used sensibly, while ensuring that human intelligence and intervention remain central to the innovation process.

SSPF 2024 Activity Report

On December 3, 2024, ISTIC, Kuala Lumpur, Malaysia held its inaugural **Sustainability Science Partners Forum 2024 (SSPF 2024)** at the National Research Foundation (NRF) in Pretoria, South Africa. Leveraging a long-standing partnership, the Forum was co-hosted by the NRF, in association with the Future Earth Africa Hub Leadership Centre (FEAHLIC) and South Africa's Department of Science and Innovation (DSI). The Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi, India, a long standing partner of ISTIC joined the forum as a Scientific Partner.

The forum aimed to tackle the unique challenges faced by the Global South within the framework of the Sustainable Development Goals (SDGs) Agenda 2030. Key issues addressed included the fragmented funding landscape, underutilization of research and innovation, capacity gaps in scientific ecosystems in the Global South, the need to align stakeholder goals with the global priorities, and the critical importance of fostering South-South and Triangular Cooperation.

The forum was officiated by the chair of ISTIC Governing Board, Prof. Dr. Mohd. Basyaruddin Abd Rahman, followed by a special video message from Mdm. Irina Bokova, the former Director General of UNESCO and ISTIC Patron. The forum featured special lectures from representatives of UNESCO Regional Office for Southern Africa, Harare (UNESCO, Harare) and United Nations Office for South-South Cooperation (UNOSSC). Ms. Rovani Sigamoney, Education Program Specialist from UNESCO Harare presented on the International Decade of Sciences for Sustainable Development initiative (IDSSD) and UNESCO's role as the science decade secretariat. UNOSSC representative, Dr. Dumitru Vasilescu, presented on UNOSSC's mandate for promoting and facilitating South-South and triangular cooperation for global development and its alignment with IDSSD. A special lecture was delivered by Prof. (Dr.) Kiran Bhujun, the Director of Tertiary Education & Scientific Research Division from the Ministry of Tertiary Education, Science and Research of Mauritius. Prof. Bhujun gave a compelling presentation on Harnessing Science and Education for Transformative Sustainability, highlighting the case of Mauritius as a Small Island Developing State (SIDS).

The forum showcased an impressive line-up of distinguished panelists from diverse backgrounds, who brought their unique perspectives to the forefront during two engaging panel discussions. These sessions delved into critical issues surrounding collaboration, exploring innovative strategies and practical solutions to overcome challenges in fostering effective partnerships. The first panel discussion was moderated by Prof. Nelson Odume, Full Professor and Director, Institute for Water Research Rhodes University and he was joined by Prof. Maano Ratmusindela, UP-UCT Future Africa Research Chair in Sustainability Transformations, Dr. Balamurugan Nallamuthu, Under Secretary, International Division Ministry of Science, Technology and Innovation (MOSTI), Malaysia and Prof. Dr. Godwell Nhamo, Chief Researcher Exxaro Chair in Climate & Sustainability Transitions UNISA.

The second panel discussion focused on the strategies and the success stories to overcome barriers in Cross Sector Collaboration for Sustainability and moderated by Dr. Daniel Nyanganyura, Director of Future Earth Africa Hub Leadership Centre (FEAHLIC). This guided discussion was joined by panellists Mr. Michael Nxumalo, Director of Science Networks and Research Link, NRF-South Africa; Dr. D. Shailaja, Chief Scientist & Chair of CSIR-Indian Institute of Chemical Technology (IICT); and Prof. Mbangiseni Patrick Nephumbada, Deputy Chairperson of South Africa National Commission of UNESCO Natural Sciences Sector Committee.

During the second half of the forum, participants engaged in three separate breakout group discussions, each tailored to address key thematic areas critical to advancing sustainable development goals in the South. These breakout sessions provided a dynamic platform for participants to exchange ideas, share experiences and collaboratively explore solutions. The discussions focused on three pivotal topics: enhancing capacity building, fostering grassroots innovations, and strengthening science, technology and innovation (STI) ecosystems in the South.

The capacity-building group examined strategies for developing skills, knowledge and institutional frameworks to empower communities and institutions. The grassroots innovation group explored ways to support and scale local, community-driven technological solutions to address pressing challenges. Meanwhile, the STI ecosystems group discussed issues and strategies to promote collaboration, policy integration, and resource mobilization for a robust and resilient STI landscape in the Global South. These focused discussions not only encouraged active engagement but also ensured that diverse perspectives and expertise contributed to the forum's objectives.

Prof. Dr. Mohd. Basyaruddin Abd Rahman, the esteemed Chair of the ISTIC Governing Board, delivered the closing remarks with a thoughtful and inspiring message emphasizing the critical role of collaboration in addressing the complex challenges in South-South Cooperation. Highlighting the power of collective action, he stressed that meaningful partnerships across disciplines, sectors and borders are essential for driving sustainable progress and innovation. His remarks served not only to conclude the forum but also to leave participants with a call to action: to continue building bridges and working together to create impactful and lasting solutions.



Memorandum of Understanding (MoU) extended between NAM S&T Centre, New Delhi and JSS Academy of Higher Education & Research, Mysuru, Karnataka, India

A **Memorandum of Understanding (MoU)** was renewed on **6 December, 2024** between the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (**NAM S&T Centre**), New Delhi, India, and the JSS Academy of Higher Education & Research (**JSS AHER**), Mysuru, Karnataka, India to further strengthen their collaborative relationship. Building on previous successful engagements, this MoU re-establishes a framework for expanding joint scientific programmes, fostering knowledge exchange and providing opportunities for researchers, especially from the developing countries.



The MoU was signed at JSS AHER, Mysuru, Karnataka, India by **Dr. Amitava Bandopadhyay**, Director General, NAM S&T Centre and **Dr. H. Basavanagowdappa**, Vice Chancellor, JSS AHER in the presence of Prof. B Suresh, Pro Chancellor, JSS AHER; Dr. Manjunatha B, Registrar, JSS AHER; Dr. Vishal Kumar Gupta, Dean (Academics), JSS AHER; Dr. Devananda D, Assistant Dean (Academics), JSS AHER; Dr. S. Suriyanarayanan, Associate Dean (Research), JSS Science and Technology University (JSS STU), Mysuru; and Mr. Sunil Kumar, Accounts Manager, NAM S&T Centre.

The MoU focuses on joint scientific programmes, including International Workshops, Training Courses and Fellowships for researchers from developing countries. It also includes cooperation on publishing scientific materials – Books, Monographs, Journals and Fact Files, related to science, technology and innovation with an aim of advancing research and knowledge dissemination.

This extended MoU exemplifies the commitment of both the institutions to further strengthen scientific collaboration, fostering capacity building and promoting the exchange of knowledge. Through this partnership, both JSS AHER and the NAM S&T Centre aim to contribute to the development of science and technology, particularly in the context of global challenges faced by developing countries.



Signing of the Memorandum of Understanding (MoU) between NAM S&T Centre and JSS Science and Technology University (JSS STU), Mysuru, Karnataka, India

On **6 December, 2024**, the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (**NAM S&T Centre**), New Delhi, India and the JSS Science and Technology University (**JSS STU**), Mysuru, Karnataka, India, formalized a new partnership by signing a **Memorandum of Understanding (MoU)**. This MoU establishes a collaborative framework between the two institutions aimed at advancing scientific cooperation and promoting mutual interests in the fields of science, engineering, technology and management.

The MoU was signed at the campus of JSS STU by **Dr. Amitava Bandopadhyay**, Director General of the NAM S&T Centre, and **Dr. S A Dhanaraj**, Registrar, JSS STU; in the presence of Prof. B Suresh, Director, TED, JSS STU; Dr. A N Santosh Kumar, Vice Chancellor of JSS STU; Dr. S. Suriyanarayanan, Associate Dean (Research), JSS STU; Mr. Sunil Kumar,



(Contd. from Page 5 - MoU.....)

Accounts Manager, NAM S&T Centre; and other esteemed members of JSS STU.

The MoU outlines several key areas of cooperation, reflecting the shared interests and goals of both the institutions involved. These initiatives aim to promote knowledge exchange, enhance research capabilities and contribute to the advancement of science and technology.

Through this partnership, both institutions aim to promote capacity building, knowledge exchange and scientific advancement, fostering long-term collaboration in various fields of engineering, science, technology and management. The joint programs, fellowships and publications will provide valuable opportunities for scientists and researchers from the developing world to enhance their skills and contribute to the global scientific progress.

Strengthening Scientific Collaboration between NAM S&T Centre, India and NAM CSSTC, Indonesia



India and Indonesia, both being the founding members of the Non-Aligned Movement (NAM) have consistently advocated for the principles of sovereignty, mutual cooperation and peaceful coexistence. As part of the NAM, they have consistently worked to advance the interests of developing countries, particularly in the fields of science, technology and innovation.

To further strengthen their shared commitments, a **Memorandum of Understanding (MoU)** was signed between the **Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre)**, New Delhi, India, and the **Non-Aligned Movement Centre for South-South Technical Cooperation (NAM CSSTC)**, Jakarta, Indonesia. This MoU formalizes the partnership of both the organisations to work together on a range of scientific initiatives aimed at benefiting the scientific communities in NAM and other developing countries.

The MoU was signed on **November 22, 2024** at the **NAM S&T Centre, New Delhi, India** by **Dr. Amitava Bandopadhyay**, Director General of the NAM S&T Centre and **His Excellency Ambassador Diar Nurbintoro**, Director of the NAM CSSTC in the presence of **Mr. Syafi Satya Sakti** and **Mr. Yoga Mahardika** from the Embassy of Indonesia in India, along with the NAM S&T Centre's staff members. This event marked a significant milestone in the relationship between the two organisations.

The MoU outlines several key areas of cooperation, including the organisation of International Workshops and Training Courses, publication of scientific Fact Files, Books and Monographs to promote human resource development in science & technology and support the broader dissemination of scientific advancements. Through these joint efforts and initiatives, both the organisations aim to foster the exchange of knowledge for scientists, experts and professionals to exchange ideas, contribute research and work together on solutions to the challenges faced by the developing countries.

This collaboration paves the way for continued scientific cooperation, strengthening the bonds between India, Indonesia, NAM and other developing countries, through shared knowledge and innovation in science and technology.



Strengthening Scientific Collaboration between NAM S&T CENTRE (New Delhi, India) and ZMT (Bremen, Germany)

The Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi, India, and the Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany have renewed their successful collaboration with the signing of a Memorandum of Understanding (MoU) on December 19, 2024. The MoU was signed by Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre; and Prof. Dr. Raimund Bleischwitz, Scientific Director and Dr. Nicolas Dittert, Administrative Director, ZMT.

This renewed partnership underscores their shared commitment to capacity building in marine sciences including Blue Economy, particularly in developing countries and to promote North-South cooperation in addressing challenges in global marine research.

As part of this initiative, building on the years of fruitful cooperation, the two institutions aim to further promote scientific exchange, enhance research collaborations and foster academic development in key areas such as Marine Science, Coastal Research and Blue Economy.

A cornerstone of this collaboration is the NAM S&T Centre and ZMT's long-standing Fellowship Programme, which was launched in 2008. Under this Fellowship, both the involved parties will jointly continue to sponsor a maximum of five fellowships annually, each lasting up to three months – to provide young scientists from developing countries with the opportunity to work at ZMT in Bremen.

Additionally, for the first time, the NAM S&T Centre and ZMT have also agreed to expand the scope of their cooperation, which includes organizing Training Programmes in Bremen focused on Marine Ecology, Blue Economy and related fields.

This renewal of the MoU signals a continued and deepening partnership between the NAM S&T Centre and ZMT, focuses on advancing scientific research, building the next generation of marine scientists in developing countries and fostering North-South cooperation to address the pressing challenges of Marine Conservation, Sustainability and Climate Change, and to promote Marine Science capacity building.

Distinguished Visitors to the Centre

| | |
|--------------------------------------|---|
| 21st October 2024 | Dr. Neville Sweijd , Director, Alliance for Collaboration on Climate & Earth Systems Science (ACCESS), Cape Town, South Africa. |
| 22nd October 2024 | H.E. Dr. Bassam Al Khatib , Ambassador; and Mrs. Manal Kaddoura , Counsellor, Embassy of the Syrian Arab Republic in India, New Delhi, India. |
| 5th November 2024 | Mr. Nguyen Truong Sinh , Head of Science and Technology Office; and Mr. William VU , First Secretary – Deputy Head of Science and Technology Office, Vietnamese Embassy to India, New Delhi, India. |
| 22th November 2024 | Ambassador Diar Nurbintoro , Director; Mr. Syafi Satya Sakti , Assistant Director for Programme, Non-Aligned Movement Centre for South-South Technical Cooperation (NAM CSSTC), Indonesia; and Mr. Yoga Mahardika , Embassy of Indonesia in New Delhi, India |
| 26th November 2024 | Mr. Nguyen Van Thuong , Senior Specialist of the International Cooperation Department, Ministry of Science and Technology (MOST), Vietnam; Mr. Nguyen Truong Sinh , Head of Science and Technology Office; and Mr. William VU , First Secretary – Deputy Head of Science and Technology Office, Vietnamese Embassy to India, New Delhi, India. |
| 11th December 2024 | Shri Sanjiv Ranjan , Officer on Special Duty (Admin.) [Secretary Rank], Ministry of External Affairs, Govt. of India, New Delhi, India and Secretary General (Designate), Indian Ocean Rim Association (IORA), Mauritius. |
| 18th December 2024 | Mr. Tariq Masroof , Second Secretary (Political), High Commission for Pakistan in New Delhi, India. |

Special Feature

**Council of Scientific and Industrial Research (CSIR), India:
A Research and Innovation Hub for Global Sustainable Development**

Role of CSIR-India in Establishing India as the “Pharmacy of the World”

CSIR, with 37 National Research Laboratories and an almost equal number of outreach centers and innovation centers across all major cities of India, has been a key driver of the country's industrial, societal, and economic growth for over eight decades.

CSIR caters to almost all industrial sectors including genomics, biotechnology, drugs & pharmaceuticals, health & wellness, food processing, agriculture, aroma & floriculture, rural & cottage industries, leather & allied industries, chemicals & fertilizers, buildings, infrastructure & constructions, mining, minerals, metals, energy, fuels, electronics, aerospace, etc. CSIR is making technological interventions both in the urban as well as rural sectors.

Through its thematic approach, CSIR is not only immensely supporting the National Missions of India but is also contributing towards the UN Sustainable Development Goals through research, technology and innovation across nine focus areas namely, 1) Healthcare (HTC); 2) Agriculture, Nutrition & Biotechnology (ANB); 3) Earth Water and Oceanography (EWO); 4) Chemicals (including leather) and Petrochemicals (CLP); 5) Aerospace, Electronics, Instrumentation & Strategic Sectors (AEISS); 6) Civil, Infrastructure & Engineering (CIE); 7) Mining, Minerals, Metals and Materials (4M); 8) Energy (Conventional & Non-Conventional) and Energy Devices (EED); and 9) Ecology, Environment and Sustainability (EES).

CSIR has a vast range of developments in all the above-mentioned areas. The present article discusses some select activities of CSIR in the Healthcare area. CSIR's efforts in the Healthcare domain cover a wide spectrum of R&D activities from Generic and Novel Drugs to Traditional Medicines, Genomics & Diagnostics, Advanced Molecular Biology; Microbial Technology; Cohort & Surveillance; Combating Antimicrobial Resistance, Medical Devices, and Instruments & Implants to name a few. The current article focuses on the role of CSIR in positioning India as the global pharmacy and in providing affordable healthcare to the world thereby contributing towards achieving the *Sustainable Development Goal 3 - Good Health and Well-being*.

The Indian pharmaceutical industry is currently the 3rd largest in terms of volume and 14th in terms of the value of pharma commodities (valued at USD 55 billion and is projected to reach USD 130 billion by 2030). The Indian pharma industry has been instrumental in providing generic drugs to the global market with supply to over 200 countries in the world. It is estimated that India supplies nearly 20% of the world's pharmaceuticals, and ~60% of the World Health Organization (WHO) prequalified APIs and ~65% of WHO's vaccine requirement. As of 2024, India has ~376 Food and Drug Administration (FDA) - registered pharmaceutical facilities and ~140 European Union (EU) GMP compiled units. Indian pharma industry majorly exports bulk drugs & drug intermediates, finished dosage formulations, biologics, Ayurvedic & herbal formulations and surgicals. CSIR has played a crucial and significant role in achieving this remarkable feat. With the introduction of the revised patent act in 1970, CSIR played a strategic role and extensively collaborated with domestic pharma companies and extended their capabilities to effectively compete in the complex field of “drug manufacturing and technology”. CSIR employed its technical skills and supported the Indian generic drug industry using a reverse engineering approach for developing pharmaceutical products, thereby enabling the pharma industry to expand its market and operations in foreign countries.

The pharma industry has collaborated with many CSIR institutes including CSIR-Indian Institute of Chemical Technology (IICT), CSIR-Central Drug Research Institute (CDRI), CSIR-Indian Institute of Integrative Medicine (IIIM), and CSIR-National Chemical Laboratory (NCL) to develop novel, cost-effective and chemically viable industrial drug manufacturing processes leading to significant increase in number of patent filings. CSIR through its strong capabilities in almost all segments of the value chain of the pharmaceutical industry, supported the Indian pharma industry, especially in the initial steps of drug discovery, development and manufacturing which requires intense R&D. For drug development and discovery, CSIR has established world-class facilities in medicinal chemistry, pharmacology, genomics, biotechnology, toxicological safety and also clinical studies.

In the area of manufacturing process, CSIR has strengthened and used its capabilities for **cost-effective process development**. Below are some of the key historical **success stories** of CSIR in the domain of **drug development**:

- CSIR-IICT developed a viable process for the production of Azidothymidine, a popular drug for the treatment of AIDS, in collaboration with M/s Cipla Ltd. After successful implementation, M/s Cipla Ltd. offered Azidothymidine at low cost to an international medical aid foundation NGO named “Médecins Sans Frontières” with an aim to cater healthcare facilities to underprivileged citizens.



Zidovudine by M/s Cipla Ltd.

(Contd. from Page 9 - Special Feature.....)

- b) CSIR-Institute of Microbial Technology (IMTECH) developed Streptokinase, a clot-buster drug, and the complete technology package for obtaining high-standard natural streptokinase was licensed to M/s Cadila Pharmaceuticals Ltd and it was introduced in the market in the year 2001.
- b) CSIR-NCL developed and patented the process for preparation of Amlodipine besylate, a long-acting calcium channel blocker. The technology was transferred to M/s Emcure Pvt Ltd for scale-up and commercialization.
- c) Under Industry-Institute collaboration, CSIR-IICT and AVRA Laboratories jointly developed and commercialized "Misoprostol", a drug useful in reducing death rates during abortion.
- d) CSR-NCL developed a process towards Chiral synthesis of "Nevirapine", a non-nucleoside reverse transcriptase inhibitor class of drug used for the treatment of HIV.
- e) CSIR-CDRI developed the process of preparation of L-Ephedrine and transferred the technology to M/s Malladi Drugs & Pharmaceuticals Ltd. Several thousand tons of drug was produced by the company based on the technology developed by CSIR and revenue about USD 15 million in foreign exchange per year was generated.

For its endeavors towards making India self-reliant and reducing import dependency, CSIR has developed innovative processes for the production of **active pharmaceutical ingredients (API)**. Below are some recent contributions of CSIR in this domain:

- a) CSIR-NCL developed a continuous, cost-effective and eco-friendly process for production of Paracetamol, one of the most popular antipyretic and analgesic across the world. The process has several unique features such as (i) use of reactive distillation technique; (ii) recycling of used acylating agent; (iii) established optimum process conditions; and (iv) organic solvent-free purification. As an estimate, the Global Acetaminophen Market is expected to reach about USD 1479 million by 2028, therefore the process beholds a huge market potential.
- b) CSIR-NCL developed a highly-efficient and scalable process for the "synthesis of Azelaic acid from Oleic acid". The process is continuous involving 100% conversion, optimization of oxidation step within 2 minutes, and efficient separation of end product. Azelaic acid is used for treatment of acne and has extensive use in the cosmetic industry. The know-how has been licensed to M/s Godrej Industries Ltd.



a) A commercial plant for manufacturing paracetamol based on CSIR-NCL's unique zero liquid discharge, fully automated continuous process technology inaugurated at M/s Satyadeeptha Pharmaceuticals Pvt Ltd



b) Azelaic acid Pilot plant

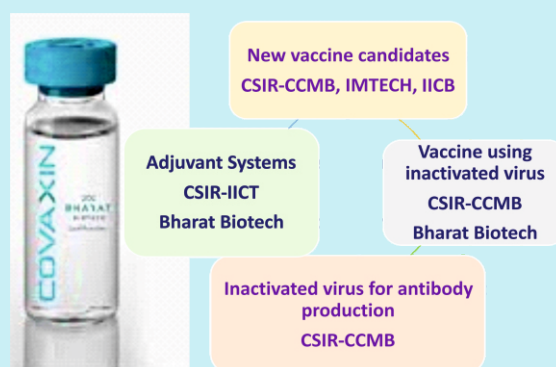
CSIR contributed significantly to the **fight against COVID-19** across five verticals i.e. surveillance; diagnostics; drugs & vaccines; hospital assistive devices; and supply chain. Some of its notable contributions that aided in managing the pandemic under the drugs and vaccines vertical are listed below:

- a) CSIR-IICT developed a scalable, cost-effective and eco-friendly process for the synthesis of Favipiravir, a Covid-19 drug. The process uses inexpensive and indigenous raw materials, has a relatively less number of steps and omits the requirement of column purification. The patented know-how was transferred to M/s Cipla Ltd and marketed in the name of Ciplenza®.
- b) For prevention of COVID-19, CSIR-IICT supported the preparation of COVAXIN®, a vaccine against COVID-19, by developing a novel, cost-effective and scalable process for the synthesis of Imidazoquinoline, an adjuvant and important ingredient for preparation of the vaccine. CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB) and other CSIR institutes contributed towards development of the vaccine system. The technology was transferred to M/s Bharat Biotech International Ltd. and the vaccine was made available globally.

(Contd. from Page 10 - Special Feature.....)



a) Ciplenza (Favipiravir) by M/s Cipla Ltd;



b) Key Role of CSIR in COVID-19 (COVAXIN®) Vaccine Development

In addition to developing methods and processes of drug development, CSIR has made great strides in the path of **novel drug discovery**.

- a) CSIR-CDRI developed Ormeloxifene or Centchroman, world's first non-steroidal once-a-week oral contraceptive pill. The technology was licensed to M/s HLL Lifecare Pvt. Ltd. The drug was also included as part of India's National Family Planning Programme. Besides contraception, Ormeloxifene is also clinically useful in the management of dysfunctional uterine bleeding, mastalgia and fibroadenoma and has promising therapeutic efficacy in a variety of cancers including breast cancer. Due to estrogenic activity, this drug also has anti-osteoporotic and cardioprotective activity.



Ormeloxifene or Centchroman contraceptive pill developed by CSIR-CDRI

- b) For accelerated fracture healing and for the management of postmenopausal osteoporosis in elderly women, CSIR-CDRI developed the standardized extract of Dalbergia sissoo. The technology was licensed to M/s Pharmenza Herbal Pvt. Ltd. And to M/s AVETA Biomics Inc., USA.
- c) CSIR-CDRI and CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP) jointly developed α - β Arteether - Schizontocidal antimalarial for Cerebral & Chloroquine Resistant Malaria. The drug was included as part of "National Anti-Malaria Program". The technology was licensed to M/s Themis Medicare Ltd and was marketed under the name of "E-MAL" in India and many other Malaria endemic countries like Kenya, Nigeria, Congo, etc. for > 20 years. CSIR-CDRI also developed another anti-malarial drug named "Larither" which was also incorporated in the "National Anti-Malaria Program". The technology was licensed to M/s IPCA Laboratories Ltd and benefited many countries in Africa.
- d) CSIR-CDRI has developed a Bacosides enriched extract of Bacopa, a memory enhancer. The technology was licensed to M/s Lumen Marketing Company and is sold under different brands in India, Malaysia, Singapore, Philippines, Australia, New Zealand, France and Germany.

CSIR offers excellent opportunities for collaboration in the sector of drug development and discovery. CSIR's focus is swiftly moving toward advanced purification & characterization techniques for the development of complex APIs, novel catalysis methods, biodegradable scaffolds, biosimilars, better and safer adjuvants for vaccines, and bioequivalence studies for circular economy. It aspires to build up in-house capability of end-to-end drug manufacturing to be self-reliant and provide affordable drugs to India and other nations. CSIR continues to drive forward research and development in the pharmaceutical sector and welcomes collaborations for pursuing cutting-edge R&D and technology partnerships from relevant RTOs, industries and start-ups.

For Partnership Interest please contact:

Dr (Mrs) Rama Swami Bansal, Chief Scientist & Head ISTAD, CSIR,
2 Rafi Marg, Anusandhan Bhawan, New Delhi - 110001, India; Email: rsb@csir.res.in



Acknowledgment: CSIR-CCMB: Dr. Vinay K. Nandicoori, Director and Theme Director, CSIR-Healthcare theme
CSIR-IICT: Dr D Srinivasa Reddy, Director and Dr Chada Raji Reddy, Chief Scientist
CSIR-ISTAD: Dr Rama Swami Bansal, Head; Dr Anand Mohit, Principal Scientist; Dr Yatendra K Satija, Senior Scientist
are acknowledged for structuring, assimilating and presenting the article.

Special Feature

COP29 UN Climate Conference Agrees to Triple Finance to Developing Countries, Protecting Lives and Livelihoods

The UN Climate Change Conference (COP29) The UN Climate Change Conference in Baku, Azerbaijan was held from 11-22 November 2024. The conference came up with a new finance goal to help countries to protect their people and economies against climate disasters, and share in the vast benefits of the clean energy boom.

With a central focus on climate finance, COP29 brought together nearly 200 countries in Baku, Azerbaijan, and reached a breakthrough agreement that will:

- Triple finance to developing countries, from the previous goal of USD 100 billion annually, to USD 300 billion annually by 2035.
- Secure efforts of all actors to work together to scale up finance to developing countries, from public and private sources, to the amount of USD 1.3 trillion per year by 2035.

Known formally as the New Collective Quantified Goal on Climate Finance (NCQG), it was arrived that all nations to unanimously agree on every word of the agreement.

Simon Stiell, Executive Secretary of UN Climate Change said "This new finance goal is an insurance policy for humanity, amid worsening climate impacts hitting every country". He added "But like any insurance policy, it only works, if premiums are paid in full, and on time. Promises must be kept, to protect billions of lives. It will keep the clean energy boom growing, helping all countries to share in its huge benefits: more jobs, stronger growth, cheaper and cleaner energy for all." The International Energy Agency expects global clean energy investment to exceed USD 2 trillion for the first time in 2024.

The new finance goal at COP29 builds on significant strides forward on global climate action at COP27, which agreed an historic Loss and Damage Fund, and COP28, which delivered a global agreement to transition away from all fossil fuels in energy systems swiftly and fairly, triple renewable energy and boost climate resilience.

COP29 also reached agreement on carbon markets which several previous COPs had not been able to achieve. These agreements will help countries deliver their climate plans more quickly and cheaply, and make faster progress in halving global emissions this decade, as required by science.

The finance agreement at COP29 comes as stronger national climate plans (Nationally Determined Contributions, or NDCs) become due from all countries next year. These new climate plans must cover all greenhouse gases and all sectors, to keep the 1.5°C warming limit within reach. COP29 saw two G20 countries, the UK and Brazil, signal clearly that they plan to ramp up climate action in their NDCs 3.0, because they are entirely in the interests of their economies and peoples.

Important agreements were also reached on transparent climate reporting and adaptation and a brief summary of other key achievements at COP29 follows below.

Article 6 of the Paris Agreement

After nearly a decade of work, countries have agreed on the final building blocks that set out how carbon markets will operate under the Paris Agreement, making country-to-country trading and a carbon crediting mechanism fully operational.

On country-to-country trading (Article 6.2), the decision out of COP29 provides clarity on how countries will authorize the trade of carbon credits and how registries tracking this will operate. And there is now reassurance that environmental integrity will be ensured up front through technical reviews in a transparent process.

At COP29, countries agreed standards for a centralized carbon market under the UN (Article 6.4 mechanism). This is good news for developing countries and particularly for least developed countries, which will get the capacity-building support they need to get a foothold in the market. Under the text agreed on Article 6.4, there is a clear mandate for the UN carbon market to align with science.

Transparency

(Contd. from Page 12 - Special Feature.....)

Transparent climate reporting made big strides forward in Baku, building a stronger evidence base to strengthen climate policies over time and helping to identify financial needs and opportunities. So far thirteen countries including: Andorra, Azerbaijan, the European Union, Germany, Guyana, Japan, Kazakhstan, Maldives, Netherlands, Panama, Singapore, Spain, and Türkiye have led the way on transparent climate reporting by submitting first Biennial Transparency Reports (BTR) and had set an example for others to follow.

In addition, all transparency negotiating items concluded successfully at COP29 with Parties expressing their appreciation for the timely completion of the Enhanced Transparency Framework (ETF) reporting tools, the technical trainings, and the support provided to developing countries for reporting under the ETF that took place in 2024.

Adaptation

COP29 was an important moment for adaptation, with the delivery of several key outcomes. The COP decision on matters relating to the least developed countries (LDCs) contains a provision for the establishment of a support programme for the implementation of National Adaptation Plans (NAPs) for the LDCs. Parties extensively discussed the second five-year assessment of progress to formulate and implement NAPs, and will continue that in June 2025.

The outcome on the global goal on adaptation sets a clear path forward on the road to COP30 for the indicators work programme, providing a process for experts to continue their technical work before passing the baton to Parties. COP29 also launched the Baku Adaptation Road Map and Baku high-level dialogue on adaptation to enhance the implementation of the UAE Framework. Finally, the outcome raises ambition by agreeing to continue unpacking transformational adaptation moving forward.

COP29 took a decisive step forward to elevate the voices of Indigenous Peoples and local communities in climate action, adopting the Baku Workplan and renewing the mandate of the Facilitative Working Group (FWG) of the Local Communities and Indigenous Peoples Platform (LCIPP).

Gender and climate change

Countries agreed a decision on gender and climate change, extending the enhanced Lima Work Programme on Gender and Climate Change for another 10 years, reaffirming the importance of gender equality and advancing gender mainstreaming throughout the convention.

They also agreed to develop a new gender action plan for adoption at COP30, which will set the direction for concrete implementation.

Civil society participation, children and youth

World leaders at COP29 were joined by civil society, subnationals, business, Indigenous Peoples, youth, philanthropy, and international organizations. More than 55,000 people attended COP29 to share ideas, solutions, and build partnerships and coalitions.

The decisions taken at COP29 also reemphasize the critical importance of empowering all stakeholders to engage in climate action; in particular under Action for Climate Empowerment (ACE). Parties recalled the importance of integrating ACE elements into national climate change policies, plans, strategies and action, and noted the secretariat's compendium of good practices for integrating ACE elements into NDCs.

COP29 marked a significant milestone as dedicated spaces were created to ensure the meaningful participation of children within the Youth-led Climate Forum for the first time. Four children, including the youngest at just 10 years old, took on roles as moderators and speakers, engaging directly with Parties and observer organizations. Their participation highlighted the importance of inclusivity and intergenerational collaboration in driving climate action.

In parallel with the formal negotiations, the Global Climate Action space at COP29 provided a platform for governments, businesses and civil society to collaborate and showcase their real-world climate solutions.

<https://unfccc.int/news>, November 24, 2024

Special Feature

WHO releases new report “*Innovative solutions for the elimination of tuberculosis among migrants and refugees*” addressing TB among refugees and migrants

The World Innovation Summit for Health (WISH), an initiative of Qatar Foundation for Education, Science and Community Development, took place from 13–14 November 2024 in Doha, Qatar. The World Health Organization (WHO), in collaboration with WISH released a new action-oriented report **Innovative solutions for the elimination of tuberculosis among refugees and migrants** on addressing tuberculosis (TB) among refugees and migrants at the seventh edition of the Summit in Doha, Qatar. The report was launched at WISH 2024 in a special session moderated by Stephen Sackur of BBC Hard Talk.

Migrants and refugees face an elevated risk of TB due to multiple compounding challenges. The migration journey, along with overcrowded, poor-quality living conditions, exploitative work environments and stigma, heightens their vulnerability. Social, cultural and financial barriers further restrict access to healthcare and vital support, while policy gaps – especially in cross-border protections – leave them unprotected. These conditions lead to delayed, disrupted or inadequate healthcare, with far-reaching social, health and economic consequences that deepen already stark health inequities.

Dr Tereza Kasaeva, Director of WHO's Global TB Programme said "The WHO/WISH report provides a robust framework for addressing TB among refugees and migrants, but it requires the collective effort of all stakeholders to make these policies a reality, backed with investments," said. Further said “The time to act is now. By implementing these proven strategies, we can turn the tide in the fight against TB, achieving a future where no one is left behind."

The report outlines ten policy options to effectively prevent and address TB among refugees and migrants. These policy options are aligned with global strategies and commitments including WHO's End TB Strategy, the political declaration from the 2023 United Nations high-level meeting on the fight against TB, WHO's global action plan on promoting the health of refugees and migrants, and the Global compacts on Refugees, and for Safe, Orderly and Regular Migration, as well as the Sustainable Development Goals. Adoption of these policy options is expected to contribute towards improved health and wellbeing of refugees and migrants.

Following are ten key policy options to dismantle the barriers that prevent displaced populations from accessing essential TB prevention and care:

1. **Mobilize political leadership:** Engage high-level leadership to secure support for addressing TB in migrants, refugees and displaced populations, integrating efforts into national strategies and plans for health and for TB.
2. **Secure adequate resources:** Boost domestic and international funding for TB prevention and care in refugee and migrant populations, prioritizing sustainable and innovative financial mechanisms and leveraging international partnerships.
3. **Protect legal rights to access health care:** Develop national health policies and legislative frameworks that guarantee refugees and migrants' legal rights to equitable, stigma-free TB care, with social protection, aligned with international laws.
4. **Strengthen multi-sectoral collaboration:** Promote cross-sector coordination between health, immigration and labour sectors to combat TB and ensure continuity of care across borders in line with WHO's Multi-sectoral Accountability Framework to end TB.
5. **Enhance cross-border initiatives and mechanisms:** Support regional consilia and cross-border collaboration to ensure seamless TB care, medicine supply and service provision for migrants.
6. **Leverage technical guidance:** Ensure refugees and migrants benefit from universal health coverage, implementing WHO-recommended TB screening, diagnosis and treatment tools.
7. **Empower civil society:** Involve refugee and migrant communities in decision-making processes and support TB advocacy to combat stigma and discrimination.

(Contd. from Page 14 - Special Feature.....)

8. **Improve surveillance:** Strengthen data systems to capture and analyse disaggregated TB data for refugees and migrants, ensuring confidentiality and data protection.
9. **Intensify targeted research:** Accelerate research to identify and dismantle critical barriers that limit refugees' and migrants' access to TB care. Focus on addressing health inequities and ensure research findings are rapidly translated into actionable policies and practices to close the gaps in care and improve outcomes.
10. **Monitor progress:** WHO, in collaboration with international organizations, will track progress on these recommendations and provide updates on their implementation at the Summit held in 2026.

The full adoption of these policy options promises to significantly enhance the health and well-being of refugees and migrants worldwide.

The report also includes case studies from regions and countries such as Qatar, the Greater Mekong Subregion, the Middle East, Cox's Bazar, the Amazonas, Eastern Africa and Poland. These case studies illustrate the effectiveness of innovative approaches and cross-sectoral collaboration in addressing TB among refugees and migrants. The report calls for urgent action and the roll-out of innovative solutions to eliminate TB among refugee and migrant populations.

<https://www.who.int/publications>, November 10, 2024

Joint NAM S&T Centre – JSS AHER, Mysuru, India Fellowship Programme – 2024

Research Completion Report of Dr. Ainaa Nadiyah Binti Abd Halim



Dr. Ainaa Nadiyah Binti Abd Halim, a researcher from the Faculty of Applied and Sciences, Universiti Malaysia Sarawak (UNIMAS), Malaysia, was selected for the Joint NAM S&T Centre – JSS AHER, Mysuru, India Fellowship Programme for the year 2024. Under this fellowship, she conducted research on “*Construction of Potential Antimicrobial Drugs and the Investigation of Structure-Activity Relationships (SAR) Using Advanced Computational Techniques*”. This project was carried out under the expert guidance of Dr. B.R. Prashantha Kumar at the JSS College of Pharmacy, Mysuru, India from May 15 to July 5, 2024.

The aim of Dr. Halim's research was to assess the antimicrobial potential of synthesized triazene and thiourea derivatives and their structure-activity relationships (SAR) through advanced computational methods. The specific objectives of the project were to perform an *in silico* evaluation of the derivatives for antibacterial and anti-inflammatory activities, assess their pharmacokinetic properties using ADMET (absorption, distribution, metabolism, excretion and toxicity) analysis, and evaluate the molecular docking and dynamics of the compounds to understand their interactions with target proteins. The compounds were selected based on their diverse functional groups, such as triazene and thiourea, which are known for their potential bioactivity.

During her fellowship, Dr. Halim conducted an extensive series of computational studies. The triazene derivatives (1–9) were first subjected to ADMET and drug-likeness analysis using the Biovia Discovery Studio platform. This analysis confirmed that the compounds exhibited favorable pharmacokinetic profiles and complied with Lipinski's Rule of Five, indicating their potential as drug candidates. The molecular docking studies, performed using Schrodinger's Glide module, evaluated the binding interactions of the compounds with key target proteins, including meso-diaminopimelate ligase (MurE) for *Escherichia coli* and dehydrosqualene synthase (CrtM) for *Staphylococcus aureus*. The docking results revealed that compounds 1, 2, 4 and 5 demonstrated stronger binding affinities to MurE and CrtM proteins than the standard antibiotic ampicillin, with binding scores ranging from -7.37 to -7.94 kcal/mol, indicating their potential as effective antimicrobial agents.

Dr. Halim also conducted molecular dynamics (MD) simulations using the Desmond package to assess the stability of selected compounds in complex with target proteins. The simulations showed that the compounds were highly stable in their binding pockets, especially compound 10, which exhibited remarkable stability. The compounds also demonstrated favorable hydrogen bonding and hydrophobic interactions, enhancing their potential as drug candidates.

For the thiourea series (10–18), molecular docking against the PI3K enzyme revealed that compounds 10, 12, and 16 had higher binding affinities than the control drug dexamethasone. ADMET analysis and MD simulations confirmed the stability of these compounds in ligand-protein complexes, suggesting their potential for anti-inflammatory applications.

Throughout the fellowship, Dr. Halim was actively engaged in scientific discussions at JSS College of Pharmacy. Dr. Halim expressed her gratitude for the support provided by the NAM S&T Centre, JSS AHER and JSS College of Pharmacy, acknowledging the guidance and resources that contributed significantly to the success of her research.

Brief News

World-first stem-cell treatment restores vision in people

The treatment given to four people with damaged cornea needs to be tested in larger trials. Three people with severely impaired vision who received stem-cell transplants have experienced substantial improvement in the sight that has persisted for more than a year. Fourth person with severely impaired vision also experienced gains in sight but that did not last. The four are the first to receive transplant made from reprogrammed stem cells to treat damage to cornea.

Nature 635, Pg 533, November 21, 2024

Driverless Cars can now predict unseen objects' movement

An algorithm could help driverless cars predict the sudden appearance of hidden vehicles, cyclists and pedestrians. 'We assured that it captured real-world complexities like hidden (objects) moving unpredictably', says Har Thiruvengada VERSESAI, a cognitive computing company in California.

New Scientist, Pg. 13, November 9, 2024

Elimination of trachoma as a public health problem in India

The World Health Organization has validated India as having eliminated trachoma as a public health problem. Trachoma is one of the leading causes of blindness globally. "India's elimination of trachoma as a public health problem is a testimony to the country's commitment to alleviating the suffering that millions have faced from this debilitating disease," said Dr Tedros Adhanom Ghebreyesus, WHO Director-General. "WHO has worked closely with India to realize this achievement". India joins Nepal and Myanmar in the WHO South-East Asia Region and 19 other countries globally that have previously achieved this feat.

www.who.int, October 8, 2024

Scientists produce world's first carbon-14 diamond battery with potential lifespan of thousands of years

Scientists and engineers from the University of Bristol and the UK Atomic Energy Authority (UKAEA) have successfully created the world's first carbon-14 diamond battery. This new type of battery has the potential to power devices for thousands of years, making it an incredibly long-lasting energy source. The battery leverages the radioactive isotope, carbon-14, known for its use in radiocarbon dating, to produce a diamond battery. Several game-changing applications are possible. Bio-compatible diamond batteries can be used in medical devices and could also be used in extreme environments—both in space and on earth, where it is not practical to replace conventional batteries.

techxplore.com, December 4, 2024

Wearable ultrasound device for muscle monitoring

Researchers from University of California - San Diego have developed a compact, wearable ultrasound device that monitors muscle activity. Attachable to the skin with an adhesive and powered by a small battery, the device wirelessly captures high-resolution images of muscle movements, enabling continuous, long-term monitoring. This new technology has potential applications in healthcare for conditions affecting muscle function, as well as in human-machine interfaces for more natural robotic control.

sciencedaily.com, October 31, 2024

Geothermal power is vying to be a major player in the world's clean-energy future

Fervo Energy, a start-up based in Houston, Texas, got a major boost as the US government gave the green light to the expansion of a geothermal plant Fervo is building in Beaver County, Utah. The project could eventually generate as much as 2,000 Megawatts, a capacity comparable with that of two large nuclear reactors. Although getting to that point could take a while, the plant already has 400 MW of capacity in the pipeline, and will be ready to provide around-the-clock power to customers by 2028. The process involves drilling a borehole up to several kilometres deep, where the rocks are at a temperature of around 200°C, and injecting water and sand at high pressure. This makes fractures in the rocks, increasing their permeability and creating a reservoir of heated water that can be continuously extracted through a second borehole. The hot, pressurized water is then used to generate electricity. This approach, known as enhanced geothermal systems (EGS)

nature.com, November 14, 2024

Vital Atlantic Ocean current is already weakening due to melting ice

A study modelling the impact of melting ice suggests scientists have underestimated the risk that an important ocean current will shut down and cause climate chaos. A vital ocean current that transports warm water to the North Atlantic is weakening faster than previously thought, according to a study models that simulate the impact of melt water from the Greenland ice sheet.

Given the pace at which the world is now overshooting its emissions targets and the rate at which 'Greenlands ice sheet is melting, the researchers say the current's strength could fall by as much as a third within 15 years.

newscientist.com, November 18, 2024

Science, Technology & Innovation News

GENETIC ENGINEERING

Sweeter tomatoes with the help of CRISPR gene editing

Selection for bigger tomatoes has made the fruits less sweet, but now it has been shown that gene editing can make them sweeter without decreasing yields. With the help of CRISPR gene editing, one can make larger tomato varieties sweeter

The bigger a tomato is, the lower its sugar content usually is, says Jinzhe Zhang at the Chinese Academy of Agricultural Sciences in Beijing. Efforts to boost the sweetness of larger varieties have had downsides such as lowering yields. So Zhang and colleagues compared different varieties to identify genetic variants that affect sweetness. They found that two closely related genes called *SICDPK27* and *SICDPK26* are more active in large varieties. These genes code for proteins that lower the levels of an enzyme that produces sugars.

When the team used CRISPR gene editing to disable these genes in a variety called MoneyMaker, the levels of glucose and fructose in the fruits increased by up to 30 per cent with no decrease in yield. The fruits were also rated as sweeter in a taste test. The only other effect was fewer and smaller seeds, which consumers may prefer.

"We are working with some companies to develop some commercial varieties by knocking out these genes," says Zhang. "It is still at the beginning stages." Besides tasting sweeter, another potential benefit is that fewer tomatoes will be needed to make tomato ketchup with the same sweetness level.

The gene-edited MoneyMaker tomatoes aren't as sweet as cherry varieties such as Sungold, but it should be possible to boost sweetness even further, says Zhang. "There are still many important genes that regulate sugar waiting to be discovered." A CRISPR-edited tomato that has high levels of a beneficial nutrient called GABA is already being sold in Japan – the first CRISPR food to go on sale – as well as being given away as seedlings.

The first ever genetically modified food to be sold commercially was also a tomato. Called Flavr Savr, it was sold in the US in paste form from 1994, but was later discontinued. Since last year, a purple GM tomato high in anthocyanins has been available in the US in fruit and seedling form. Several countries, including Japan and China, have regulations that make it easier for gene-edited crops to get approval compared with other forms of genetic modification, not counting conventional breeding. China approved its first gene-edited crop last year, a soya bean with raised levels of oleic acid.

newscientist.com, November 13, 2024

HEALTH

Surprising discovery pinpoints when good cholesterol becomes harmful

Houston Methodist researchers have discovered that certain components of so-called "good" cholesterol high-density lipoproteins (HDL)—may be associated with an increased prevalence of cardiovascular disease. Led by Henry J. Pownall, Ph.D., professor of biochemistry in medicine at the Houston Methodist Research Institute, and Khurram Nasir, M.D., M.P.H., a cardiologist and division chief of cardiovascular prevention and wellness at Houston Methodist, the research team is using innovative methods to investigate the role of certain properties of HDL in heart health. "During routine checkups, adults have their cholesterol levels tested, which includes both 'bad' (LDL) and 'good' (HDL) cholesterol," said Pownall and their study appeared in the *Journal of Lipid Research*.

"Not all cholesterol, however, is born the same. What is not commonly recognized is that each type of cholesterol has two forms—free cholesterol, which is active and involved in cellular functions, and esterified, or bound, cholesterol, which is more stable and ready to be stored in the body. Too much free cholesterol, even if it is in HDL, could contribute to heart disease". In pre-clinical studies, the research team discovered that HDL with a high content of free cholesterol is likely dysfunctional. To validate their findings and prove their hypothesis, they are currently at the halfway point of the Houston Heart Study in which they will be studying 400 patients with a range of plasma HDL concentrations. Pownall and Nasir are the co-PIs of the study.

"The most surprising finding from our study thus far is that there is a strong link between the amount of free cholesterol in HDL and how much of it accumulates in white blood cells called macrophages, which can contribute to heart disease," Pownall said. While it was previously thought that the transfer of free cholesterol to HDL was beneficial for heart health by removing excess cholesterol from tissues, Pownall said their data shows that in the context of high plasma HDL concentrations, the reverse is true, wherein free cholesterol transfer from HDL to the white blood cells in blood and tissues could actually raise one's risk for cardiovascular disease.

The researchers say once they reach their immediate goal of showing that excess free cholesterol in HDL is associated with excess cardiovascular disease, they plan to develop new diagnostics and treatments for managing heart disease, as well as use HDL-free cholesterol as a biomarker to identify patients requiring HDL-lowering therapies.

If they are successful, Pownall proposes that they could potentially be able to apply what they learn to patients in a clinical setting as quickly as six years from now.

medicalxpress.com, December 19, 2024

ENERGY & GREEN TECHNOLOGY

Discovery of trimodal energy storage material boosts renewable energy potential

Monash University researchers have made a breakthrough in energy storage technology that could significantly advance the global shift away from fossil fuels. The discovery, detailed in a study published Dec. 18 in *Nature*, involves new thermal energy

(Contd. from Page 17 - STI News)

storage (TES) material that could help harness renewable energy more effectively and efficiently.

This TES material could provide a more sustainable solution to one of the major challenges in renewable energy storage: how to store large amounts of energy inexpensively and sustainably. The newly discovered material integrates three modes of energy storage, creating a "trimodal" system that stores thermal energy with unprecedented efficiency.

"This material represents a major leap forward in thermal energy storage," said lead study author, Dr. Karolina Matuszek, from the Monash University School of Chemistry. "By integrating three distinct forms of energy storage into one material, we've achieved a level of efficiency and performance that was previously unattainable," she said. "This development has the potential to reshape the renewable energy landscape." "If we can store energy more effectively, we make renewable energy more reliable and that brings us closer to a sustainable, decarbonized future."

The material, a mixture of boric and succinic acids, undergoes a transition at around 150°C and can store a record-breaking 600 MJ per m³ of energy, which is almost two times higher than many existing materials. This novel trimodal system opens new possibilities for the Carnot battery, a cutting-edge energy storage technology. A Carnot battery converts *electrical energy* into thermal energy for storage, then back into electricity when needed. In this design, the new material acts as the key component in storing the thermal energy with a capacity to withstand more than 1,000 heating and cooling cycles, demonstrating excellent stability and performance over time.

The key to the material's performance is its ability to store energy through three mechanisms simultaneously. First, it stores sensible heat as it warms up, then, during melting of the mixture, the boric *acid* undergoes a chemical reaction that further stores energy. Remarkably, the chemical reaction is highly reversible, allowing the material to be used repeatedly without degradation, a breakthrough in thermo chemical TES materials.

Importantly, the material is both low-cost and environmentally friendly. Boric acid, a flame-retardant substance derived from boron ores, and succinic acid, a bio-based chemical, are inexpensive and sustainably sourced. This makes the material not only more cost-effective than current lithium battery technology but also more environmentally sustainable and not relying on scarce metals.

"The ability of this material to function so effectively in Carnot batteries could transform how we store renewable energy," said Dr. Matuszek. "It's not just about storing energy—it's about doing so in a way that is scalable, sustainable, and cost-effective." One of the great advantages of this material is its sustainability. Boric acid and succinic acid are both inexpensive and environmentally friendly, making this a truly green solution for *energy storage*."

techxplore.com, December 19, 2024

CHEMICAL ENGINEERING

Eco-friendly reactor mimics lightning to produce ammonia from air and water

There's a good chance you owe your existence to the Haber-Bosch process. This industrial chemical reaction between hydrogen and nitrogen produces ammonia, the key ingredient in synthetic fertilizers that supply much of the world's food supply and enabled the population explosion of the last century.

It may also threaten the existence of future generations. The process consumes about 2% of the world's total energy supply, and the hydrogen required for the reaction mostly comes from fossil fuels. Taking inspiration from how nature including lightning produces ammonia, a team led by the University at Buffalo has developed a reactor that produces the chemical commodity from nitrogen in the air and water, without any carbon footprint. This plasma-electrochemical reactor, described in a study published in the *Journal of the American Chemical Society*, can sustain a high ammonia production rate of approximately 1 gram per day for over 1,000 hours at room temperature, and does so directly from air. The researchers say this is a significant advance toward green ammonia synthesis at industrially competitive production rate and reaction stability. "Ammonia is often considered the chemical that feeds the world, but we also have to face the realization that the Haber-Bosch process has not been modernized since its invention 100 years ago. It still uses high-temperature, high-pressure processing, and generates a large carbon footprint, making it unsustainable for the long term," says the study's corresponding author, Chris Li, Ph.D., assistant professor of chemistry in the UB College of Arts and Sciences. "Our process only requires air and water, and can be powered by renewable electricity."

In the UB-led team's two-step reactor, the role of lightning is replaced with plasma and the role of bacteria replaced by a catalyst of copper-palladium. "Our plasma reactor converts humidified air into nitrogen oxide fragments, which are then placed in an electrochemical reactor that uses the copper-palladium catalyst to convert them into ammonia," Li says.

Crucially, the catalyst is able to absorb and stabilize the numerous nitrogen dioxide intermediates created by the plasma reactor. The team's graph theory algorithm identified that most nitrogen oxide compounds have to cycle through nitric oxide or amine as an intermediate step before becoming ammonia. This allowed the team to intelligently design a catalyst that binds favourably with those two compounds.

"When plasma energy or a lightning strike activates nitrogen, you generate a soup of nitrogen oxide compounds. To simultaneously convert, in our case, up to eight different chemical compounds into ammonia is incredibly difficult," says Xiaoli Ge, the study's first author and a postdoctoral researcher in Li's lab. "Graph theory essentially allows us to map out all the different reaction paths and then identify a bottleneck chemical. We then optimize our electrochemical reactor to stabilize the bottleneck chemical, so that all the different intermediates will be selectively transferred into ammonia."

Li's team is currently in the process of scaling up their reactor and are exploring both a startup and partnerships with industry to help commercialize it. UB's Technology Transfer Office has filed a patent application on the reactor and methods for its use.

(Contd. from Page 18 - STI News)

Over half the world's ammonia is produced by four countries: China, the United States, Russia and India, whereas many developing countries are unable to produce their own. While the Haber-Bosch process must be conducted on a large scale in a centralized power plant, Li says their system can be done at a much smaller scale.

"You can imagine our reactors in something like a medium-sized shipping container with solar panels on the roof. This can then be placed anywhere in the world and generate ammonia on demand for that region," he says. "That's a very exciting advantage of our system, and it will allow us to produce ammonia for underdeveloped regions with limited access to the Haber-Bosch process."

phys.org, December 19, 2024

A new biodegradable material to replace certain microplastics

MIT chemical engineers designed an environmentally friendly alternative to the micro beads used in some health and beauty products.

To combat global micronutrient deficiency crises, MIT researchers developed novel materials that protect fragile nutrients under harsh cooking and storage conditions. The micro particles seen here are made of biodegradable polymers that dissolve in the stomach to release encapsulated vitamins and minerals.

Microplastics are an environmental hazard found nearly everywhere on Earth, released by the breakdown of tires, clothing, and plastic packaging. Another significant source of microplastics is tiny beads that are added to some cleansers, cosmetics, and other beauty products. In order to cut off some of these microplastics at their source, MIT researchers have developed a class of biodegradable materials that could replace the plastic beads which are now used in beauty products. These polymers break down into harmless sugars and amino acids.

"One way to mitigate the microplastics problem is to figure out how to clean up existing pollution. But it's equally important to look ahead and focus on creating materials that won't generate microplastics in the first place," says Ana Jaklenec, a principal investigator at MIT's Koch Institute for Integrative Cancer Research. These particles could also find other applications. In the new study, Jaklenec and her colleagues showed that the particles could be used to encapsulate nutrients such as vitamin A. Fortifying foods with encapsulated vitamin A and other nutrients could help some of the 2 billion people around the world who suffer from nutrient deficiencies.

Jaklenec and Robert Langer, an MIT Institute Professor and member of the Koch Institute, are the senior authors of the paper, which appeared in *Nature Chemical Engineering*. The paper's lead author is Linzixuan (Rhoda) Zhang, an MIT graduate student in chemical engineering.

In 2019, Jaklenec, Langer, and others reported a polymer material that they showed could be used to encapsulate vitamin A and other essential nutrients. They also found that people who consumed bread made from flour fortified with encapsulated iron showed increased iron levels.

The researchers, led by Zhang, turned to a type of polymer that Langer's lab had previously developed, known as poly(beta-amino esters). These polymers, which have shown promise as vehicles for gene delivery and other medical applications, are biodegradable and break down into sugars and amino acids. By changing the composition of the material's building blocks, researchers can tune properties such as hydrophobicity (ability to repel water), mechanical strength, and pH sensitivity. After creating five different candidate materials, the MIT team tested them and identified one that appeared to have the optimal composition for microplastic applications, including the ability to dissolve when exposed to acidic environments such as the stomach.

The researchers showed that they could use these particles to encapsulate vitamin A, as well as vitamin D, vitamin E, vitamin C, zinc, and iron. Many of these nutrients are susceptible to heat and light degradation, but when encased in the particles, the researchers found that the nutrients could withstand exposure to boiling water for two hours.

They also showed that even after being stored for six months at high temperature and high humidity, more than half of the encapsulated vitamins were undamaged.

To demonstrate their potential for fortifying food, the researchers incorporated the particles into bouillon cubes, which are commonly consumed in many African countries. They found that when incorporated into bouillon, the nutrients remained intact after being boiled for two hours. "Bouillon is a staple ingredient in sub-Saharan Africa, and offers a significant opportunity to improve the nutritional status of many billions of people in those regions," Jaklenec says.

In this study, the researchers also tested the particles' safety by exposing them to cultured human intestinal cells and measuring their effects on the cells. At the doses that would be used for food fortification, they found no damage to the cells.

To explore the particles' ability to replace the micro beads that are often added to cleansers, the researchers mixed the particles with soap foam. This mixture, they found, could remove permanent marker and waterproof eyeliner from skin much more effectively than soap alone.

The researchers hope their work could help to significantly reduce the amount of microplastic released into the environment from health and beauty products.

news.mit.edu, December 6, 2024

MATERIAL SCIENCE

Low-cost polymer boosts high-density data storage performance and sustainability

A new material for high density data storage can be erased and recycled in a more efficient and sustainable way and providing a

(Contd. from Page 19 - STI News)

potential alternative to hard disk drives, solid-state drives and flash memory in the future. The low-cost polymer stores data as "dents," making a miniscule code in patterns, with the indents just nanometers in size and promising to store more data than typical hard disk drives.

The new polymer, which can have the information in it wiped in seconds by short bursts of heat and can be reused several times, is described in a new article published in the journal *Advanced Science*. "This research unlocks the potential for using simple, renewable polysulfides in probe-based mechanical data storage, offering a potential lower-energy, higher density and more sustainable alternative to current technologies," says first author and Ph.D. candidate Abigail Mann, from the College of Science and Engineering at Flinders University. Made from low-cost materials, sulfur and dicyclopentadiene, the researchers used an atomic force microscope and a scanning probe instrument to make and read the indentations. Senior author Professor Justin Chalker says the development is the latest example of new era polymers capable of making a difference to a wide range of industries. "The age of big data and artificial intelligence is increasingly driving demand for data storage solutions," says Professor Chalker. "New solutions are needed for the ever-growing computing and data storage needs of the information era. "Alternatives are being sought to hard disk drives, solid-state drives and flash memory which are constrained by data density limits or the amount of information they can store in a particular area or volume."

By using the method, the polymer chemistry team at Flinders University demonstrated data storage densities that exceed typical hard disk drives. The polymer chemistry method allowed for the data writing, reading and erasing to be repeated many times, which is important in computing and data storage.

The concept of storing data as indents on the surface of materials has been explored previously by computing giants such as IBM, LG Electronics and Intel. While this mechanical data storage strategy provided some very promising demonstrations and innovations in storage, the energy requirements, costs, and complexities of the data storage materials are some of the barriers to commercializing the technology.

Senior researchers Dr. Pankaj Sharma and Dr. Christopher Gibson say the Flinders polymer addresses these challenges with its unique physical structure that allows mechanical force to encode the data via an indentation, and a chemical structure that allows rapid reorganization of the polymer upon heating to erase that indent. "The low cost of the building blocks (sulfur and dicyclopentadiene) are an attractive feature that can support future development of the polymer in data storage applications," adds Chalker Lab Ph.D. candidate Samuel Tonkin.

techxplore.com, December 17, 2024

INFORMATION SCIENCE

A more accurate indicator for measuring the visibility of scientific journals

Researchers from Universidad Carlos III de Madrid (UC3M), Universidad de León (ULE) and São Paulo State University (UNESP) in Brazil have developed an indicator that is more robust, clear and fair than "impact factor," which has been widely used for decades to evaluate academic and scientific journals. This new indicator, which they call "Real Influence," has numerous practical applications, ranging from the evaluation of research projects and accreditations to tenure applications and the identification of unusual citation patterns in scientific journals.

According to one of its authors, Antonio Perianes, professor in the Department of Library and Information Science at UC3M, the indicator "aims at a rational and contextualized evaluation of scientific journals, not a magic formula for decision-making based solely on numbers." He adds, "It is not intended to be a single metric (since it cannot capture all the complexity of science) and should always be complemented with qualitative evaluations of scientific publications."

Real Influence seeks to provide an improved alternative to "impact factor," which calculates the average number of citations per scientific publication. The issue with this system, according to the researchers, is that it provides information about the individual visibility of each publication but is not immune to distortions caused by highly cited articles, among other drawbacks. For example, the impact factor measurement tends to be higher in fields where publications and citations are more frequent (such as biomedical sciences or technology) or does not reflect the long-term impact of a publication (since it typically measures citations within two years after publication).

"Our initial goal in creating Real Influence was to develop a tool that would make it possible to show the visibility of all publications in a journal and allow for comparisons between them," explains Perianes. "This approach enables comparisons of journal distributions of different sizes without distortions, which is especially important as it avoids disadvantages for journals with lower output compared to those with significantly higher publication volumes."

To conduct the study, recently published in the journal *Quantitative Science Studies*, the team compared the performance of the new indicator across nearly 400 journals in the fields of Library and Information Science, Biochemistry and Molecular Biology. The analysis results show that Real Influence is less vulnerable to manipulation, better represents the complete distribution of publications and, above all, provides a more detailed and fairer perspective based on the visibility of each article.

The methodology of Real Influence is inspired by the use of percentiles in fields such as economics or pediatric growth. This approach avoids biases caused by exceptionally cited articles by not only evaluating the citations received, but also considering the relative position of each article within the universe of citations within its category. This makes it easily adaptable and implementable in any data system compatible with citation studies, such as WoS or Scopus.

phys.org, November 29, 2024

S&T for Least Developed Countries- A Special News Feature

UN Technology Bank leads focus on technology transfer to Least Developed Countries at WAITRO Summit – Nanjing, China

World Association of Industrial and Technological Research Organizations (WAITRO) is a global not-for-profit organization that provides a forum for research and development experts to amplify their efforts towards solving global challenges. WAITRO Summit 2024 was held during November 13-15 at Nanjing, China. During Summit, The UN Technology Bank in a meeting with global experts looked at ways to accelerating technology transfer to the world's poorest countries. Led by UN Technology Bank Managing Director Deodat Maharaj, the forward-looking session provided an opportunity to hear from global leaders in technology and innovation, as well as the private sector. The emphasis was to sensitise the leading industrial research organizations on the opportunities that exist in the Least Developed Countries and why it was important to find ways concrete and practical ways to transfer technology to the people of these countries.

Professor Hasan Mandal, President of the Scientific and Technological Research Council of Turkey (TÜBİTAK) and President of WAITRO highlighted the importance of fostering collaboration with least developed countries in science, technology and innovation. However, he noted that technology transfer was more complex than it may seem as the 45 Least Developed Countries have diverse and differing priorities. According to him, the first step is to understand the needs of the least developed countries. In this regard, he highlighted the value of the UN Technology Bank's Technology Needs Assessments.

Explaining China's rich experience in building ecosystems for sustainable results Wang Qin, Director General of the Committee of Science and Technology, Jiangsu Province described the considerable economic growth in the region over the past four decades. He noted this was a result of implementing science, technology and innovation policies. He said the main reason for the success was continually learning lessons from other countries such as Germany, Japan and Singapore. "The key contribution to growth is what we call total factor productivity. That's a contribution of STI to the growth of economy," he explained. "We can make things happen. If it can happen here in Jiangsu, there is no reason to believe it cannot happen in another part. I firmly believe the LCDs have the opportunity to do so."

Jean-Marc Champagne, Principal and Managing Director Seneca Impact Advisors Limited shared his views on how to get business involved in delivering solutions for least developed countries. He said: "In order to make the private sector thrive, you have to have the right government policies in place. Because if you don't have that, then the private sector is going to be trading water and not making a lot of progress." He cited the example of Seneca Impact Advisor's work in Laos PDR that focused on coffee production as a strategy for diversifying the economy and generating export revenue in a climate and ecologically friendly manner. He underscored the importance of adding value to exports, such as processing coffee beans instead of exporting them raw as way to enhance productivity and economic gains.

Offering his perspective on a regional approach to delivering solutions on industrial development, Hans-Erich Schulz, CEO Caribbean Industrial Research Institute said that small territories such as those in the Caribbean are an immediate disadvantage for scale in terms of markets. Therefore, he stressed the importance of industrial research supporting small and medium enterprises.

Looking ahead, President of WAITRO spoke to the importance of the UN Technology Bank working with WAITRO and its membership of industrial research organizations to deliver results via technology transfer to LDCs.

www.un.org, November 13, 2024

FACT FILE

Fact File: Lightning



Lightning is one of the most hazardous natural phenomena, with nearly everyone around the globe encountering it each year. Given these risks, the implementation of lightning protection systems is crucial for mitigating the dangers associated with lightning strikes. Despite advancements in technology, the impact of lightning remains particularly pronounced in developing countries. In these regions, agricultural workers and outdoor laborers are especially vulnerable due to the lack of protective infrastructure and limited public awareness. This highlights the importance of continued research and the development of robust mitigation strategies to address the societal and economic consequences of lightning.

Recognizing the paramount significance of this issue from both socio-economic and environmental perspectives, the NAM S&T Centre has published its fifth Fact File titled "Lightning". This document provides a comprehensive overview about lightning impacts and covers the important issues such as phenomenology of lightning; protection of structures from lightning and also provides roadmap for mitigating lightning fatalities, injuries and property loss

in the developing countries.

The Fact File has been jointly prepared by the South Asian Lightning Network (SALNet), Kathmandu, Nepal in collaboration with the NAM S&T Centre. The Fact File has been conceptualized and edited by **Dr. Shriram Sharma**, Amrit Campus, Tribhuvan University, Kathmandu, Nepal and Chairman, South Asian Lightning Network (SALNet), Nepal with contributions from **Mr. Ronald Holle**, National Lightning Safety Council, USA; **Dr. Daile Zhang**, University of North Dakota and National Lightning Safety Council, USA and **Prof. Mary Ann Cooper**, Managing Director, African Centres for Lightning and Electromagnetics Network (ACLENet), Uganda.

**PEREZ-GUERRERO TRUST FUND
FOR SOUTH-SOUTH COOPERATION (PGTF) OF G-77**

**PROJECT ON
CLIMATE RESILIENT AGRICULTURE IN THE GLOBAL SOUTH:
ADAPTATION & MITIGATION STRATEGIES AND
HUMAN RESOURCE DEVELOPMENT**

Climate change variability and extreme climate events pose major risk factors on the performance and management of agricultural systems. Countries in the Global South are more vulnerable to climate change variability as a huge population is dependent on agriculture. In addition, there exists significant pressure on natural resources and non-availability of adequate coping mechanisms. In view of the above, it is essential to develop appropriate adaptation and mitigation strategies as well as develop adequate human resources towards climate resilient agriculture in developing countries.

Considering the importance of the subject, the NAM S&T Centre, New Delhi submitted a proposal to Perez-Guerrero Trust Fund for South-South Cooperation (PGTF) of G-77 to undertake a collaborative project titled '**Climate Resilient Agriculture in the Global South: Adaptation & Mitigation Strategies and Human Resource Development**' with involvement of the NAM S&T Centre Member Countries.

The Project aims to address the effects of climate change vulnerability and extreme climate events on the performance and management of agricultural systems and focusing on the adaptation and mitigation strategies tailored to the needs of agricultural communities in the Global South. The Project also focuses on human resource development in climate resilient agriculture.

The NAM S&T Centre received approval on the above project from the Executive Secretariat of the G-77, New York with the partial financial support under the PGTF Programme of G-77.

The Centre has already received consents from 9 Participating Developing Countries (PDCs) namely: Egypt, Iraq, Mauritius, Nigeria, Palestine, South Africa, Sri Lanka, Uganda and Zimbabwe for the Project.

Under this project, an International Workshop and a Training Programme will be organized for the representatives from the PDCs. Further, a "State-of-the-Art Report" will be prepared based on the information collected from various countries on the vulnerability of agricultural sector due to extreme climate events. A set of recommendations would be made on the best practices for climate resilient agriculture.

Distinguished Visitors to the Centre



Shri Sanjiv Ranjan, Officer on Special Duty [Secretary Rank], Ministry of External Affairs, Govt. of India, New Delhi, India and Secretary General (Designate), Indian Ocean Rim Association (IORA), Mauritius.



H.E. Dr. Bassam AlKhatib, Ambassador and Mrs. Manal Kaddoura, Counsellor, Embassy of the Syrian Arab Republic in India, New Delhi, India.



Mr. Nguyen Truong Sinh, Head of Science and Technology Office and Mr. William VU, First Secretary – Deputy Head of Science and Technology Office, Vietnamese Embassy to India, New Delhi, India.



Dr. Neville Sweijd, Director, Alliance for Collaboration on Climate & Earth Systems Science (ACCESS), Cape Town, South Africa.



Mr. Tariq Masroof, Second Secretary (Political), High Commission for Pakistan in New Delhi, India.

Centre Announces

International Workshop on Food, Water, Energy Nexus and Sustainability

20-21 February 2025

El-Ain El-Sokhna, Egypt

Climate change poses significant challenges to water, food and energy security, particularly in developing countries. Despite their minimal contribution to global greenhouse gas emissions, these countries are heavily impacted by disruptions in the interconnected systems of water, food and energy. Changes in climate patterns, such as increased temperatures and unpredictable rainfall can cause water shortages that affect agricultural production leading to food insecurity. Similarly, energy production which relies on water for cooling and hydropower is also vulnerable to water scarcity, thus creating a cycle of challenges that exacerbates the vulnerabilities of these sectors.

The interdependency amongst water, food and energy systems underscores the urgency for integrated and holistic approaches to address the global challenges. In this context, it is clear that solutions must span across multiple sectors and foster a unified policy approach. A nexus approach helps to identify and manage the trade-offs and synergies that arise between them.

In order to address these growing concerns and promote an integrated approach to sustainability, the NAM S&T Centre is pleased to announce the organization of an International Workshop on “Food, Water, Energy Nexus and Sustainability”, to be held on February 20-21, 2025 in El-Ain El-Sokhna, Egypt jointly with the National Committee for Environmental Issues, Egypt [affiliated with the Academy of Scientific Research and Technology (ASRT), Cairo, Egypt].

The Workshop aims to adopt the nexus approach, in order to enhance water, energy and food security and mitigate the negative effects of climate change. The main objective of the Workshop is to bring together representatives and subject experts from various countries to share experiences and strategies to interlink the sectors for food, water and energy security under the challenges of climate change scenarios.

Researchers, scientists, innovators, government officials, policymakers, legal experts and representatives from industry and non-government organizations, research and academic organizations from the NAM and other developing countries are invited to participate in this workshop.

Scientists and experts desirous of participating in the Workshop, except those from Egypt, should submit their applications electronically to the Director General, NAM S&T Centre, New Delhi at namstcentre@gmail.com. Applicants from Egypt should submit their requests directly to Mrs. Reham Sabry, Supervisor of the International Scientific Relations, Academy of Scientific Research & Technology of Egypt at asrt.organizations@gmail.com.

EDITOR: Dr. Kavita Mehra ❖ ASSOCIATE EDITOR: Ms. Nidhi Utreja ❖ CONTRIBUTORS: Ms. Jasmeet Kaur Baweja and Ms. Abhirami Ramdas
 COMPILATION & DESIGN: Mr. Pankaj Buttan ❖ PUBLISHED BY: Dr. Amitava Bandopadhyay, Director General, Centre for Science & Technology of the
 Non-Aligned and Other Developing Countries (NAM S&T Centre), Core 6A, 2nd Floor, India Habitat Centre, Lodhi Road, New Delhi-110003 (India)
 PHONE: +91-11-24645134, 24644974 ❖ E-MAIL: namstcentre@gmail.com ❖ WEBSITE: <https://www.namstct.org>

Lovely Printers, New Delhi, E-mail: lovelyprintersindia@gmail.com; Ph: 9811086866.