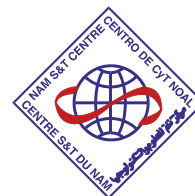


# NAM

## S&T Newsletter



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

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### FROM THE DG'S DESK

Warmest greetings to our Esteemed Readers!!



It is with immense pride that we have completed 35 years of the NAM S&T Centre in August 2024. Since 1989, the Centre has been engaged in implementing a large number of Programmes and Projects for S&T capacity building in the Global South for collective self-reliance and promoting innovation as well as addressing emerging global challenges.

In this quarter, an International Training Programme on "STI Policy: Roles of STI for Excellence in Commercialization in Emerging Economies" was conducted by the Centre during September 12-14, 2024 jointly with the International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC) in Kuala Lumpur, Malaysia. The event was hosted by ISTIC, Kuala Lumpur.

Further, the Centre has published two books through the leading International Publisher Springer Nature, Singapore. The first one is a monograph titled "Emerging Trends in Leather Science and Technology" which offers insights into sustainable manufacturing practices, environmental management as well as emerging product design concepts in the leather sector; and the second one is a publication titled "Arsenic Remediation of Food and Water: Technological Interventions and Perspectives from Developing Countries" with twenty two chapters on the problems of arsenic contamination in groundwater, technological options for arsenic remediation, food safety and effects of arsenic on human health. This book on arsenic remediation is an outcome of the project titled "Reducing Arsenic Exposure from Food and Water in Developing Countries – A Road Map for Technological Solutions for the Future" partially funded by the G-77 Secretariat through the *Perez Guerrero Trust Fund (PGTF)*.

Additionally, the book titled "Water Management in Developing Countries and Sustainable Development", which was earlier published by the Centre was formally launched on August 7, 2024 at JSS Academy of Higher Education and Research (JSS AHER) in Mysuru, Karnataka, India.

We are pleased to announce the Call for applications for 2025 for the "Joint NAM S&T Centre - ZMT Bremen (Germany) Fellowship" on 'Blue Economy in Tropical Coastal Marine Research'. We encourage interested eligible scientists to apply for the fellowship. For further details, please visit our website: [www.namstct.org](http://www.namstct.org).

The Centre also announces the organisation of an International Workshop on "Patenting for Economic Growth: Opportunities and Challenges," on October 24-25, 2024, in partnership with the Ministry of Education, Tertiary Education, Science & Technology, Mauritius (in Virtual Mode).

The NAM S&T Centre is committed to enhancing S&T collaborations and empowering scientists and researchers worldwide especially in the Global South. Together let us advance science and technology for the betterment of all our Member States and other stakeholders.

Thank you for your continued support, engagement and guidance.

Happy Reading!!

*Amitava Bandopadhyay*  
**(Amitava Bandopadhyay)**  
Director General

### Centre Organised

International Training Programme on  
**STI Policy: Roles of Science Technology and  
Innovation for Excellence in Commercialization  
in Emerging Economies**

Kuala Lumpur, Malaysia, 12-14 September 2024

In the contemporary global economy, Science, Technology and Innovation (STI) serve as a crucial



catalyst for the economic growth, competitiveness and societal advancement. Emerging economies, with their dynamic markets and developmental ambitions, are poised to benefit immensely from the effective STI policies. These economies stand at a critical juncture where the strategic implementation of STI can propel them towards sustainable and inclusive growth, fostering

global economic integration and prosperity. Developing countries, particularly in the Global South, face significant knowledge gaps in formulating comprehensive STI policies.

Acknowledging the crucial roles of STI and relevant policies in technological innovation, commercialization, socio-economic development and recognizing the need for policymakers to view STI as a catalyst for excellence in commercialization and economic growth, the *International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC)* under the auspices of UNESCO, Kuala Lumpur in collaboration with the *Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre)*, New Delhi organized an International Training Programme on "STI Policy: Roles of STI for Excellence in Commercialization in Emerging Economies" during 12-14 September 2024 in Kuala Lumpur, Malaysia.

(Contd. from Page 1 - Intl Trg. Prog. on STI Policy.....)

The International Training Programme was designed to address the pressing need for capacity building in STI policy formulation and implementation, with a special focus on “Commercialization”. The programme equipped policymakers, researchers, industry leaders and key stakeholders from emerging economies with the essential knowledge and practical tools to create an environment that nurtures scientific and technological innovation, leading to successful commercialization.

Participants delved into the principles and frameworks of effective STI policies, explored best practices & global case studies and engaged in rich knowledge exchange and networking. The programme emphasized on developing practical skills for policy implementation and crafting strategies to bridge the gap between research and market readiness. By focusing on these areas, the training empowered stakeholders to transform the scientific advancements into commercially viable products and services, thereby driving economic growth and development.

The Training Programme was hosted by ISTIC in Kuala Lumpur and was attended by 26 participants from 13 countries namely Egypt, India, Indonesia, Iran, Iraq, Myanmar, Mauritius, Pakistan, Peru, South Africa, Zambia and Zimbabwe and the host country Malaysia.

At the outset, Dr. Amitava Bandopadhyay, Director General, NAM S&T delivered the Welcome Address. He expressed his gratitude to Prof. Dr. Mohd. Basyaruddin Abdul Rahman, Chair, ISTIC Governing Board and Dr. Sharizad Dahlan, Director, ISTIC for introducing creative and innovative ideas in this world class global institution despite a number of challenges. He further stated that the NAM S&T Centre would always be willing to extend cooperation with ISTIC for mutual benefit and would look forward to enhancing S&T collaboration for collective self-reliance of the Global South. He thanked Prof. Basyaruddin, Dr. Sharizad and other team members from ISTIC especially Ms. Zarmila Salmi Sabot, Mr. Azim Noor and Mr. Hazman Al-Hafiz Hazal for the successful organization of the event. Dr. Bandopadhyay thanked all the staff members from the NAM S&T Centre for their sincere efforts towards successful organisation of the Training Programme. He further thanked the esteemed Focal Point of the Centre from Malaysia, Dr. Balamurugan Nallamuthu, Under Secretary, International Division, Ministry of Science, Technology & Innovation (MOSTI), Malaysia and other members of his team for their continued support to the Centre over the years.

Opening remarks were delivered by Prof. Dr. Mohd Basyaruddin Abdul Rahman, Chair, ISTIC Governing Board. Prof. Mohd Basyaruddin, in his remarks, mentioned that the training programme represents a key milestone in our collective efforts to promote sustainable development and harness the power of STI for the betterment of societies across the Global South. He extended his appreciation to the NAM S&T Centre for partnering with ISTIC and organizing this important event. With the participation of 26 experts, professionals and policymakers from 13 countries, this programme embodies the spirit of international collaboration and shared learning. He further added that the programme starting on September 12 coincided with the UN Day for South-South Cooperation, which celebrates the collaborative efforts of developing nations, emphasizing the importance of exchanging resources, knowledge and technology.

A Video Message on UN Day for South-South Cooperation 2024 was given by Ms. Dima Al Khatib, Director, UN Office for South-South Cooperation (UNOSSC).



(Contd. from Page 2 - Intl Trg. Prog. on STI Policy.....)

The format of the three day training programme was comprised of 4 *Modules* to understand roles of STI policies in commercialization; *Special Lectures* and *Group Activities*. Each session was followed by an Online Quiz and Game-based Learning.

### **Module 1: Understanding Commercialization**

Training Lecture on Module 1 was focused on understanding commercialization and was given by Prof. Zamri Mohamed, UTM Perdana School of Science Technology and Innovation Policy, Universiti Teknologi Malaysia. Various components of the module discussed during the lecture were: Science, Technology and Innovation; Commercialization as part of the Innovation Process; Commercialization needs and Ecosystem Support and Policy.

### **Module 2: Ecosystem for Commercialization – Pathways to Innovation and Economic Growth**

Training Lecture on Module 2 that focused on ecosystems to support commercialization was given by Dr. Intan Sazrina Saimy, Universiti Teknologi Malaysia. The key issues such as challenges and strategies in commercialization were discussed during the lecture.

### **Module 3: STI Policies for Commercialization**

Training Lecture on Module 3 was focused on STI Policy for Commercialization and was given by Prof. Zamri Mohamed. Policy issues such as Misconception on Policy, Critical Role of Policy, STI Policy and Policy on STI Commercialization were discussed during the lecture.

### **Module 4: Making the STI Policies Work**

Training Lecture on Module 4 that focused on developing STI policy was given by Dr. Siti Hasliah Salleh. Her presentation outlined policy process, policy methodology and discordances in policymaking.

### **Special Lectures**

A Special Lecture on “Sharing Malaysian Experience on STI Policy Development” was given by Puan Hazami Habib, Chief Executive Officer, Academy of Sciences Malaysia.

Another Special Lecture on “Strategic STI Policy Design: A Case Study from Mauritius” was given by Prof. (Dr.) Kiran Bhujun, Director, Tertiary Education and Scientific Research Division, Ministry of Education, Tertiary Education, Science and Technology (METEST), Mauritius. Prof. Bhujun highlighted that Mauritius actively promotes Science, Technology and Innovation (STI) and believes that a national policy on STI would adequately reflect its commitment to becoming a leading knowledge hub in the region.

### **Interactive Session on “Innovation, Technology Transfer and Commercialization”**

A session was arranged for the participants that allowed them to interact, engage, discuss and present short case studies on “Innovation, Technology Transfer and Commercialization” specific to their countries. Participants from Egypt, India, Indonesia, Iran, Iraq, Malaysia, Mauritius, Myanmar, Peru, South Africa, Zambia and Zimbabwe presented their cases during the Interactive Session.

### **Group Work on “Mini Policy Development”**

For mini policy development exercise, participants were divided into 5 groups. Each group was assigned one thrust area. The participants discussed and developed strategies, action plans and milestones for guiding the implementation of the STI Policy for Commercialization. Five thrust areas for group presentations were: *Human Resource for Commercialization*; *Technology for Commercialisation*; *Culture for Commercialization*; *Resources for Commercialization* and *Leadership for Commercialization*. Presentations made by each group were discussed and evaluated by a technical team of experts and prizes were awarded.

At the end of the Programme, Closing Remarks were given by Dr. Sharizad, Director, ISTIC and Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre. The participants thanked the organizers for the successful organization of the event. Feedbacks were then provided by the participants.

## Book Launch

# WATER MANAGEMENT IN DEVELOPING COUNTRIES AND SUSTAINABLE DEVELOPMENT

The Book Launch Ceremony of our recent publication titled '*Water Management in Developing Countries and Sustainable Development*', a joint initiative of the Centre for Science and Technology for the Non-aligned and Other Developing Countries (NAM S&T Centre) and JSS Academy of Higher Education and Research (JSS AHER) was held on August 7, 2024 in the Board Room, JSS AHER, Mysuru, India. The book was edited by Dr. S. Suriyanarayanan, Associate Dean (Research), JSS Science and Technology University, Mysuru, Karnataka, India; Dr. Shivaraju H. P., Associate Professor, Department of Environmental Sciences, JSS Academy of Higher Education and Research, Mysuru; and Dr. David Jenkins, Associate Professor, Nanomaterials and Devices, School of Engineering, Computing and Mathematics, Faculty of Science and Engineering, University of Plymouth, United Kingdom. The book has been published by Springer Nature, Singapore.



The book consists of 24 chapters contributed by authors from 14 countries, including Cameroon, China, Cyprus, India, Indonesia, Italy, Namibia, the Netherlands, Norway, Portugal, South Africa, the UK, the USA and Zimbabwe – emphasizes on sustainable water resource management principles, recent advances in water treatment, and case studies that direct future research, development and policymaking in the Global South. The publication specifically addresses *Sustainable Development Goal 6 (Access to Water and Sanitation for All)* and aims to enhance best practices in water resource allocation, groundwater protection and water quality assurance.

The program commenced with an inaugural address by Prof.(Dr.) Vishal Kumar Gupta, Dean (Academics), JSS AHER who provided an overview of the book and welcomed the esteemed dignitaries and attendees to the event. Following this, Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre, New Delhi delivered his remarks highlighting the collaborative spirit behind the book. Dr. Shivaraju H. P., elaborated on the fruitful partnership between the NAM S&T Centre and JSS AHER, noting that the book serves as a follow-up to the International Workshop on '*Gender Issues in Water Management in Developing Countries and Sustainable Development*' that was held in February 2022 through Hybrid Mode, in partnership with the NAM S&T Centre, New Delhi; JSS AHER, Mysuru, and the Scientific Committee on Problems of the Environment (SCOPE), Delft, Netherlands.

Dr. Surinder Singh, Vice-Chancellor, JSS AHER, Mysuru then conveyed his greetings and emphasized the milestone this book represents for the institution. He commended the editors for their collaborative efforts and acknowledged the NAM S&T Centre's commitment to producing such high quality and relevant publications for the developing world.

Prof. (Dr.) B. Suresh, Pro-Chancellor, JSS AHER expressed gratitude to all the dignitaries present and underscored the long-standing and successful relationship between the NAM S&T Centre and JSS AHER. He encouraged the younger generation to put in efforts and engage in such successful initiatives. Further, he mentioned the possibilities of exploring Cancer Research, Drug Development, Nanotechnology and related areas as future fields of interest between the NAM S&T Centre and JSS AHER.

Dr. S. Suriyanarayanan, Associate Dean (Research), JSS Science and Technology University, Mysuru in his concluding remarks expressed gratitude to the NAM S&T Centre, JSS AHER, and all contributors, highlighting the book's significance in promoting sustainable water management practices and achieving SDG-6 in the Global South.

The event was also attended by Prof. Dr. H. Basavanagowdappa, Principal, JSS Medical College and Dr. Pramod Kumar, Dean of the Faculty of Pharmacy, JSS Academy of Higher Education and Research.



## *Special Feature*

### **S&T Capacity Building and Human Resource Development in India: Role of Council of Scientific and Industrial Research (CSIR)**

**SA Hasan and Geetha Vani Rayasam**

Human Resource Development Group  
CSIR Complex, Library Avenue, Pusa, New Delhi -110012

Council of Scientific & Industrial Research (CSIR), India is a frontier research and development institution which was established in 1942 and is acknowledged for its pioneering research, development and innovation in different fields of science, engineering and is a modern day R&D organization. CSIR has a network of 37 national laboratories with 39 outreach centres.

CSIR has contributed enormously for socio-economic development of India over the decades, through its technologies, knowledge base and capacity building. CSIR's laboratories are spread across India and conduct pioneer research in a wide range of scientific disciplines. It offers technological solutions in numerous areas including those of societal concern, industry needs, strategic interests and human resource development. Over the years, CSIR has established strong industry linkages and has also helped in creating the entrepreneurial ecosystem in India<sup>1</sup>. Today, CSIR is poised to address the emerging challenges such as climate change, affordable healthcare, food security and rural development among others<sup>2</sup>. One of the key areas where CSIR has contributed enormously in India is human resource development in science and technology.

#### **Human Resource Development: CSIR's efforts**

##### ➤ **Research Fellowships**

CSIR started extramural research support to scientists working in universities and R&D institutions way back in 1943 with 'Research Schemes'. 'Research Fellowships' were identified as one of the functions of the Council when it was set up in 1942, highlighting the importance given to supporting the young researchers in the country.

Over the years, CSIR has instituted various fellowship schemes to help students to pursue their research interests in various domains of science and engineering. For selection of Research Fellows, CSIR conducts the National Eligibility Test called Joint CSIR-UGC National Eligibility Test (NET). Qualifying in this test is also necessary for teaching in Indian universities. The main aim of the doctoral and postdoctoral fellowship programme is to identify talented young researchers and foster the potential scientific talent and train to pursue independent research.

The doctoral and postdoctoral fellowships instituted by CSIR and offered to the Indian students for pursuing their career in S&T research are:

- (i) CSIR-JRF-NET: The award of Junior Research Fellowships (JRFs) is through the Joint CSIR-UGC National Eligibility Test (NET) conducted by CSIR since March 1983. This is one of the biggest initiatives in the country in terms of providing fellowships for bright students for pursuing research in basic sciences. The JRF fellowship is upgraded to Senior Research Fellowship (SRF) after two years with higher research fellowship. The overall tenure of JRF and SRF together is five years.
- (ii) Senior Research Fellowship (SRF)-Direct: Young motivated students who are engaged in R&D and have shown promising research ability through publications, but do not qualify the JRF-NET Exam are awarded SRF Direct through a rigorous selection process. A sizeable number of Senior Research Fellowships are granted for pursuing the doctoral research in varied disciplines of science, engineering and technology.
- (iii) Research Associateship (RA): For pursuing the postdoctoral research in the area of science, medical, pharmaceutical, veterinary sciences and engineering.

(Contd. from Page 5 - Special Features.....)

- (iv) Senior Research Associateship (SRA): The associateship provides provisional assignments to exceedingly qualified Indian engineers, technologists, researchers scientists and medical professionals coming back from abroad and are seeking jobs in India.

The details with respect to these doctoral and postdoctoral fellowships are available on CSIR-HRDG website: [www.csirhrdg.res.in](http://www.csirhrdg.res.in).

#### ➤ **Research Scheme and Emeritus Scientist Programme**

Another major activity of promoting research and development in the country is the Extramural Research Scheme of CSIR which was instituted in 1943 with the objective to invest in basic and interdisciplinary research. Extramural (EMR) schemes are intended to supplement ongoing research in universities, national laboratories and provide modest support by providing grants for hiring of researchers, chemicals and consumable etc.

For Utilizing the talent and research experiences of superannuated Scientists for carrying out R&D and mentoring of young researchers, CSIR instituted the Emeritus Scientist programme. This programme is playing a critical role in creation, sustaining and to replenish the pool of skilled and qualified S&T manpower in the country .

#### ➤ **Travel and Symposia Grant Scheme: contribution in promotion of knowledge sharing**

To promote interaction amongst researchers working in specific disciplines and advancement of scientific temper, CSIR provides financial assistance for organizing a national/international symposium/seminar/conference/ etc. in India and Travel Grant for Research Scholars to Regular/Adhoc/Contract Employees (Non-CSIR) as its efforts towards promoting interaction amongst researchers and knowledge sharing.

#### ➤ **Awards**

Shanti Swarup Bhatnagar (SSB) Prize for Science and Technology in 1957 and CSIR Young Scientist Awards (YSA) in 1987 were instituted with the objective of promoting excellence and recognizing outstanding contributions made by young scientists. The SSB Prizes and YSA prizes have now been subsumed with **Rashtriya Vigyan Puraskar (RVP)**, which are newly initiated national S&T awards by Government of India, with a broader mandate and categories that include Vigyan Ratna, Vigyan Shri, Vigyan Yuva-SSB and Vigyan Team awards. More details may be seen at <https://www.myscheme.gov.in/schemes/rvp>.

**Bhatnagar Fellowship:** Bhatnagar Fellowship which is selective and highly prestigious. It was instituted to recognize and gainfully utilize the expertise of outstanding and acclaimed researchers for augmenting the scientific and technological competitiveness of the country and mentoring of young scientists.

#### ➤ **New Initiative of Promoting Women Scientists: ASPIRE**

CSIR envisaged a scheme exclusively for women scientists in order to provide impetus to the R&D being carried out by them. On the occasion of International Women's Day 2023, "A Special Call for Research Grants for Women Scientists (CSIR-ASPIRE)" was made by CSIR. Overwhelming response was received with a total of about 3000 online proposals submitted. The discipline-wise search and selection research committees selected after rigorous evaluation, a total of about 300 research proposals. Such initiatives will go a long way in boosting women in Science, Technology, Engineering and Mathematics (STEM) not only in India but globally.

#### **Conclusions:**

India has one of the youngest populations in an aging world. India's all-round progress depends on the progress in scientific R&D which in turn depends on nurturing and honing the S&T human resources. The schemes described above are an essential requirement for strengthening the R&D efforts which are critical for the scientific and economic development of the country. These schemes provide time tested models of developing human resources in S&T for India and the world at large.

**Sources:**

<https://www.csir.res.in/about-us/about-csir>.

[www.csirhrdg.res.in](http://www.csirhrdg.res.in).

<https://dbt Bharat.gov.in>. <https://es.csirhrdg.res.in/csir-aspire>

## *Special Feature*

### **The United Nations' Summit of the Future**

The United Nations' Summit of the Future was held on 22-23 September 2024 at New York. The Summit brought together over 4000 individuals from Heads of State and Government, observers, IGOs, UN System, civil society and non-governmental organizations. The Summit of the Future: Multilateral Solutions for a Better Tomorrow was first proposed by UN Secretary-General António Guterres in his Our Common Agenda report in September 2021. The aim of the Summit was twofold: to accelerate efforts to meet our existing international commitments, and take concrete steps to respond to emerging challenges and opportunities.

During the Summit, World leaders (22 September, 2024) adopted a **Pact for the Future** that includes a Global Digital Compact and a Declaration on Future Generations. This Pact is the culmination of an inclusive, years-long process to adapt international cooperation to the realities of today and the challenges of tomorrow. The most wide-ranging international agreement in many years, covering entirely new areas as well as issues on which agreement has not been possible in decades, the Pact aims above all to ensure that international institutions can deliver in the face of a world that has changed dramatically since they were created.

Overall, the agreement of the Pact is a strong statement of countries' commitment to the United Nations, the international system and international law. Leaders set out a clear vision of an international system that can deliver on its promises is more representative of today's world and draws on the energy and expertise of governments, civil society and other key partners.

“The Pact for the Future, the Global Digital Compact, and the Declaration on Future Generations open the door to new opportunities and untapped possibilities,” said the Secretary-General during his remarks at the opening of the Summit of the Future. The President of the General Assembly noted that the Pact would lay the foundations for a sustainable, just, and peaceful global order for all peoples and nations.

The Pact covers a broad range of issues including peace and security, sustainable development, climate change, digital cooperation, human rights, gender, youth and future generations, and the transformation of global governance.

Key deliverables in the Pact include:

#### 1. *In the area of peace and security*

- The most progressive and concrete commitment to Security Council reform since the 1960s with plans to improve the effectiveness and representativeness of the Council including by redressing the historical under-representation of Africa as a priority.
- The first multilateral recommitment to nuclear disarmament in more than a decade with a clear commitment to the goal of totally eliminating nuclear weapons.
- Agreement to strengthen international frameworks that govern outer space including a clear commitment to prevent an arms race in outer space and the need to ensure all countries can benefit from the safe and sustainable exploration of outer space.
- Steps to avoid the weaponization and misuse of new technologies, such as lethal autonomous weapons and affirmation that the laws of war should apply to many of these new technologies.

#### 2. *On sustainable development, climate and financing for development*

- The entire Pact is designed to turbo-charge implementation of the Sustainable Development Goals.
- The most detailed agreement ever at the United Nations on the need for reform of the international financial architecture so that it better represents and serves developing countries, including:
  - Giving developing countries a greater say in how decisions are taken at international financial institutions;
  - Mobilizing more financing from multilateral development banks to help developing countries meet their development needs;

(Contd. from Page 7 - Special Features.....)

- Reviewing the sovereign debt architecture to ensure that developing countries can borrow sustainably to invest in their future with the IMF, UN, G20 and other key players working together;
  - Strengthening the global financial safety net to protect the poorest in the event of financial and economic shocks through concrete actions by the IMF and Member States; and
  - Accelerating measures to address the challenge of climate change, including through delivering more finance to help countries adapt to climate change and invest in renewable energy.
- Improving how we measure human progress, going beyond GDP to capturing human and planetary wellbeing and sustainability.
  - A commitment to consider ways to introduce a global minimum level of taxation on high-net-worth individuals.
  - On climate change, confirmation of the need to keep global temperature rise to 1.5 °C above pre-industrial levels and to transition away from fossil fuels in energy systems to achieve net zero emissions by 2050.

### 3. *On digital cooperation*

- The Global Digital Compact, annexed to the Pact, is the first comprehensive global framework for digital cooperation and AI governance.
- At the heart of the Compact is a commitment to design, use and govern technology for the benefit of all. This includes commitments by world leaders to:
  - Connect all people, schools and hospitals to the Internet;
  - Anchor digital cooperation in human rights and international law;
  - Make the online space safe for all, especially children through actions by governments, tech companies and social media;
  - Govern Artificial Intelligence with a roadmap that includes an International Scientific Panel and a Global Policy Dialogue on AI;
  - Make data more open and accessible with agreements on open-source data, models and standards;
  - This is also the first global commitment to data governance, placing it on the UN agenda and requiring countries to take concrete actions by 2030.

### 4. *Youth and future generations*

- The first ever Declaration on Future Generations with concrete steps to take account of future generations in our decision-making including a possible envoy for future generations.
- A commitment to more meaningful opportunities for young people to participate in the decisions that shape their lives, especially at the global level.

### 5. *Human rights and gender*

- A strengthening of our work on human rights, gender equality and the empowerment of women.
- A clear call on the need to protect human rights defenders.
- Strong signals on the importance of engagement of other stakeholders in global governance, including local and regional governments, civil society, private sector and others.

**PRESS RELEASE: United Nations adopts ground-breaking Pact for the Future to transform global governance.**

<https://www.un.org/en/summit-of-the-future>



## Brief News

### The world's fastest microscope makes its debut

Researchers have developed a laser-based microscope that snaps images at attosecond or a billionth of a billionth of a second speed. Dubbed "attomicroscopy," the technique can capture the zippy motion of electrons inside a molecule with much greater precision than previously possible, physicist Mohammed Hassan and colleagues report August 21 in *Science Advances*:

The technique could let researchers watch how a chemical reaction occurs or probe how electrons move through DNA. That information could help scientists craft new materials or personalized medicines.

<https://www.sciencenews.org>, August 21, 2024

### MIT chemists synthesize plant-derived molecules that hold potential as pharmaceuticals

MIT chemists have developed a new way to synthesize complex molecules that were originally isolated from plants and could hold potential as antibiotics, analgesics, or cancer drugs. *Large multi-ring-containing molecules known as oligocyclotryptamines have never been produced in the lab until now.* According to scientists this approach could also be used to generate new variants that may have even better medicinal properties, or molecular probes that can help to reveal their mechanism of action.

<https://news.mit.edu>, August 12, 2024

### New process vaporizes plastic bags and bottles, yielding gases to make new, recycled plastics

Chemists have developed a catalytic process that turns the largest component of today's plastic waste stream, polyolefin plastic bags and bottles, into gases -- propylene and isobutylene -- that are the building blocks of polypropylene and other types of plastics. The process uses inexpensive solid catalysts that can be scaled to industrial production, making this a potentially viable means of creating a circular economy for these throw-away plastics

<https://www.sciencedaily.com>, August 29, 2024

### Biodiversity beyond National Jurisdiction Agreement for Marine Conservation

India became the 91<sup>st</sup> country to sign the Biodiversity Beyond National Jurisdiction Agreement for marine conservation in early July. Also known as the High Seas Treaty, the agreement directs countries to commit to conservation and sustainable use of marine biodiversity in Ocean areas beyond national jurisdictions.

*Down to Earth: Pg 12, August 1-15, 2024*

### Climate Change

The US Environment Protection Agency on July 22 announced \$4.3 billion funding for 25 new projects to tackle climate change.

*Down to Earth: Pg 12, August 16-31, 2024*

### How a new kind of vaccine could lead to the eradication of Alzheimer's

The disease is Alzheimer's, the most common form of dementia, which causes untold pain to people and their relatives. But now it seems there may be a way to defuse this problem. Lou Reese, co-founder of biotechnology company Vaxxinity, which is based in Cape Canaveral, Florida, is working on vaccines designed to halt the progression of Alzheimer's or even stop it from developing in the first place. If everything goes to plan, by 2030 the firm will offer a new drug that will revolutionise our approach to one of the world's most feared diseases, and may even lead to its eradication. Several other companies are in the same game and the approach is showing great promise.

<https://www.newscientist.com>, August 27, 2024

### From Cancer to Brain Health: A New Alzheimer's Treatment Emerges

According to a recent study by researchers at Penn State, Stanford University, and an international team of collaborators, a type of drug that was developed for treating cancer holds promise as a new treatment for neurodegenerative diseases such as Alzheimer's. The scientists discovered that by blocking a specific enzyme called indoleamine-2,3-dioxygenase 1, or IDO1 for short, they could rescue memory and brain function in models that mimic Alzheimer's disease.

<https://scitechdaily.com>, September 1, 2024

### Synthetic Blood Stem Cells Herald New Era in Bone Marrow Transplants

Scientists have engineered blood stem cells capable of being transplanted successfully into mice, paving the way for personalized blood disorder treatments in children, potentially revolutionizing bone marrow transplants.

This breakthrough allows for the creation of transplantable blood cells from any cell of the patient, potentially transforming the lives of those with severe blood disorders. The successful application in immune-deficient mice opens the door to clinical trials and future therapies.

<https://scitechdaily.com>, September 2, 2024

### MIT Makes Titanium Alloys Tougher and More Flexible Than Ever

Researchers at MIT have developed a new approach for creating titanium alloys that surpass traditional trade-offs between strength and ductility.

By adjusting chemical composition, lattice structure, and processing techniques, they've created materials with enhanced mechanical properties. This innovation could be used to produce metals with exceptional combinations of strength and ductility, for aerospace and other applications.

<https://scitechdaily.com>, September 3, 2024

### mRNA vaccine for Lung Cancer

Trials of the world's first mRNA vaccine for lung cancer have begun in seven countries. About 130 people in the UK, Germany, Hungary, Poland, Spain and Turkey will be inoculated by the BNT116 vaccine made by BioNTech, designed to treat non-small cell lung cancer, the most common form of the disease. According to World Health Organization, lung cancer is the leading cause of cancer related deaths, globally, accounting for the highest mortality rate.

*Down to Earth: pg. 10, September 16-30, 2024*

## Science, Technology & Innovation News

### GENETICS

#### Machine learning approach helps researchers design better Gene-Delivery Vehicles for Gene Therapy

Gene therapy could potentially cure genetic diseases, but it remains a challenge to package and deliver new genes to specific cells safely and effectively. Existing methods of engineering one of the most commonly used gene-delivery vehicles, adeno-associated viruses (AAV), are often slow and inefficient.

Now, researchers at the Broad Institute of MIT and Harvard have developed a machine-learning approach that promises to speed up AAV engineering for gene therapy. The tool helps researchers engineer the protein shells of AAVs, called capsids, to have multiple desirable traits, such as the ability to deliver cargo to a specific organ but not others or to work in multiple species. Other methods only look for capsids that have one trait at a time.

The team used their approach to design capsids for a commonly used type of AAV called AAV9 that more efficiently targeted the liver and could be easily manufactured. They found that about 90% of the capsids predicted by their machine learning models successfully delivered their cargo to human liver cells and met five other key criteria.

They also found that their machine learning model correctly predicted the behavior of the proteins in macaque monkeys even though it was trained only on mouse and human cell data. This finding suggests that the new method could help scientists more quickly design AAVs that work across species, which is essential for translating gene therapies to humans.

The findings, which appeared in *Nature Communications*, come from the lab of Ben Deverman, institute scientist and director of vector engineering at the Stanley Center for Psychiatric Research at the Broad. Fatma-Elzahraa Eid, a senior machine learning scientist in Deverman's group, was the first author on the study. "This was a really unique approach," Deverman said. "It highlights the importance of wet lab biologists working with machine learning scientists early to design experiments that generate machine learning enabling data rather than as an afterthought". Group leader Ken Chan, graduate student Albert Chen, research associate Isabelle Tobey, and scientific advisor Alina Chan, all in Deverman's lab, also contributed significantly to the study.

Traditional approaches for designing AAVs involve generating large libraries containing millions of capsid protein variants and then testing them in cells and animals in several rounds of selection. This process can be costly and time-consuming, and generally results in researchers identifying only a handful of capsids that have a specific trait. This makes it challenging to find capsids that meet multiple criteria.

Deverman and Eid first used an initial round of machine learning modeling to generate a new moderately sized library, called Fit4Function, that contained capsids that were predicted to package gene cargo well. The team screened the library in human cells and mice to find capsids that had specific functions important for gene therapy in each species. They then used that data to build multiple machine learning models that could each predict a certain function from a capsid's amino acid sequence. Finally, they used the models in combination to create "multifunction" libraries of AAVs optimized for multiple traits at once. As proof of concept, Eid and other researchers in Deverman's lab combined six models to design a library of capsids that had multiple desired functions, including manufacturability and the ability to target the liver across human cells and mice. Almost 90% of these proteins displayed all of the desired functions simultaneously.

<https://medicalxpress.com>, August 8, 2024

### NEUROSCIENCE

#### Drug Protects against Air Pollution-related Alzheimer's Signs in Mice

A study led by the USC Leonard Davis School of Gerontology shows how feeding mice a drug called GSM-15606 provides protection against air pollution-related increases in proteins linked to Alzheimer's disease.

Senior author Caleb Finch, USC University Professor at the USC Leonard Davis School, has studied air pollution's effects on the brain for several years, especially the consequences of exposure to fine particulates found in pollution from automobiles, factories and more. Many studies have shown that air quality has a sizeable impact on risk of Alzheimer and accelerates cognitive decline, he said. Air pollution is correlated with systemic inflammation and promotes the formation of amyloid plaques, the clumps of aggregated peptide A $\beta$ 42 that form between the brain's nerve cells in Alzheimer's.

(Contd. from Page 10 - STI News)

The latest work from Finch's lab, published August 12 in *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, highlights the potential protection offered by a type of drug called a gamma-secretase modulator. The team tested a specific drug called GSM-15606, which was developed by study co-authors Rudolph E. Tanzi of Harvard and Kevin D. Ryneerson of the University of California, San Diego.

GSM-15606 was fed to mice over eight weeks; during that time, the animals were regularly exposed to air pollution in the form of either ambient nanoparticulate matter (nPM) or diesel exhaust particles (DEP). Following air pollution exposure, mice fed GSM-15606 had much lower levels of A $\beta$ 42 in the brain than mice exposed to pollution but not the drug. The results indicate that GSM-15606 may one day have a role as a preventive measure against Alzheimer's in people living with air pollution, Finch said. "Because gamma secretase is needed for normal functions body-wide, this drug was designed to modulate, but not inhibit, production of A $\beta$ 42," he said. "This is the first example of a new drug developed to slow Alzheimer's that may also protect aging individuals from the environmental risk factor of air pollution."

<https://medicalxpress.com>, August 12, 2024

### New Research Suggests a Possible Prevention Path for Autism

Researchers found that altering neurotransmitters in early development could prevent autism spectrum disorders in mice, indicating potential early interventions for ASD.

Autism spectrum disorders (ASD) are characterized by mild to severe impairment of social, behavioral, and communication abilities. These disorders can have a debilitating impact on academic performance, employment, and other life areas. Neurobiologists from the University of California San Diego have found evidence of altered development of the nervous system in mouse models of autism spectrum disorders. In their study, recently published in the *Proceedings of the National Academy of Sciences*, they linked environmentally induced forms of ASD to changes in neurotransmitters, the chemical messengers that allow neurons to communicate with each other. They also discovered that manipulating these neurotransmitters at early stages of development can prevent the appearance of autistic-like behaviors.

"In seeking the root causes of autism spectrum disorder behaviors in the brain, we found an early change in neurotransmitters that is a good candidate to be the primary cause," said School of Biological Sciences Professor Nicholas Spitzer of the Department of Neurobiology and Kavli Institute for Brain and Mind. "Getting a handle on the early events that trigger ASD may allow development of new forms of intervention to prevent the appearance of these behaviors."

The study's lead author, Swetha Godavarthi, and colleagues investigated neurotransmitter expression in the medial prefrontal cortex, a brain area often affected in individuals diagnosed with ASD. They tested the hypothesis that changes in the type of neurotransmitter expressed by neurons in the prefrontal cortex could be responsible for a chemical imbalance that causes ASD-like behaviors. These agents caused the brief loss of the "GABA" neurotransmitter, which is inhibitory, and the gain of the "glutamate" neurotransmitter, which is excitatory, in neonatal mice. Although this GABA-to-glutamate transmitter switch reversed spontaneously after a few weeks, adult mice exhibited altered behaviors of repetitive grooming and diminished social interaction. Overriding this brief early transmitter switch in neonatal mice prevented the development of these autistic-like behaviors in adults.

<https://scitechdaily.com>, September 3, 2024

## ELECTRONICS/GREEN TECHNOLOGY

### New Substrate Material for Flexible Electronics could help Combat E-Waste

Electronic waste, or e-waste, is a rapidly growing global problem, and it's expected to worsen with the production of new kinds of flexible electronics for robotics, wearable devices, health monitors, and other new applications, including single-use devices.

A new kind of flexible substrate material developed at MIT, the University of Utah, and Meta has the potential to enable not only the recycling of materials and components at the end of a device's useful life, but also the scalable manufacture of more complex multilayered circuits than existing substrates provide. "We recognize that electronic waste is an ongoing global crisis that's only going to get worse as we continue to build more devices for the internet of things, and as the rest of the world develops," says Wallin, an assistant professor in MIT's Department of Materials Science and Engineering. To date, much academic research on this front has aimed at developing alternatives to conventional substrates for flexible electronics, which primarily use a polymer called Kapton, a trade name for polyimide. Kapton has many advantages, including excellent thermal and insulating properties and ready availability of source materials.

(Contd. from Page 11 - STI News)

"It's everywhere, in every electronic device basically," including parts such as the flexible cables that interconnect different components inside your cellphone or laptop, Wang explains. It's also widely used in aerospace applications because of its high heat tolerance. "It's a classic material, but it has not been updated for three or four decades," he says.

However, it's also virtually impossible to melt or dissolve Kapton, so it can't be reprocessed. The same properties also make it harder to manufacture the circuits into advanced architectures, such as multilayered electronics. The alternative material that the team developed, which is itself a form of polyimide and therefore should be easily compatible with existing manufacturing infrastructure, is a light-cured polymer similar to those now used by dentists to create tough, durable fillings that cure in a few seconds with ultraviolet light. Not only is this method of hardening the material comparatively fast, it can operate at room temperature. The new material could serve as the substrate for multilayered circuits, which provides a way of greatly increasing the number of components that can be packed into a small form factor.

As for recyclability, the team introduced subunits into the polymer backbone that can be rapidly dissolved away by an alcohol and catalyst solution. Then, precious metals used in the circuits, as well as entire microchips, can be recovered from the solution and reused for new devices. "We break the polymer back into its original small molecules. Then we can collect the expensive electronic components and reuse them," Wallin adds. "We all know about the supply chain shortage with chips and some materials. The rare earth minerals that are in those components are highly valuable. And so we think that there's a huge economic incentive now, as well as an environmental one, to make these processes for the recapture of these components."

<https://techxplore.com>, August 6, 2024

## MATERIAL SCIENCE

### Using AI to find the Polymers of the future

Nylon, Teflon, Kevlar, these are just a few familiar polymers large-molecule chemical compounds that have changed the world. From Teflon-coated frying pans to 3D printing, polymers are vital to creating the systems that make the world function better.

Finding the next groundbreaking polymer is always a challenge, but now Georgia Tech researchers are using Artificial Intelligence (AI) to shape and transform the future of the field. Rampi Ramprasad's group develops and adapts AI algorithms to accelerate materials discovery.

Two papers published in the *Nature* family of journals highlight the significant advancements and success stories emerging from years of AI-driven polymer informatics research. The first, featured in *Nature Reviews Materials*, showcases recent breakthroughs in polymer design across critical and contemporary application domains: energy storage, filtration technologies, and recyclable plastics. The second, published in *Nature Communications*, focuses on the use of AI algorithms to discover a subclass of polymers for electrostatic energy storage, with the designed materials undergoing successful laboratory synthesis and testing.

Ramprasad, a professor in the School of Materials Science and Engineering said "Only in recent years we have begun to see tangible, real-world success stories in AI-driven accelerated polymer discovery. These successes are now inspiring significant transformations in the industrial materials R&D landscape. That's what makes this review so significant and timely."

Ramprasad's team has developed groundbreaking algorithms that can instantly predict polymer properties and formulations before they are physically created. The process begins by defining application-specific target property or performance criteria. Machine learning (ML) models train on existing material-property data to predict these desired outcomes. Additionally, the team can generate new polymers, whose properties are forecasted with ML models.

While AI can accelerate the discovery of new polymers, it also presents unique challenges. The accuracy of AI predictions depends on the availability of rich, diverse, extensive initial data sets, making quality data paramount. Additionally, designing algorithms capable of generating chemically realistic and synthesizable polymers is a complex task.

The real challenge begins after the algorithms make their predictions: proving that the designed materials can be made in the lab and function as expected and then demonstrating their scalability beyond the lab for real-world use. Ramprasad's group designs these materials, while their fabrication, processing, and testing are carried out by collaborators at various institutions, including Georgia Tech. Professor Ryan Lively from the School of Chemical and Biomolecular Engineering frequently collaborates with Ramprasad's group and is a co-author of the paper published in *Nature Reviews Materials*.

Using AI, Ramprasad's team and their collaborators have made significant advancements in diverse fields, including energy storage, filtration technologies, additive manufacturing, and recyclable materials.

<https://www.sciencedaily.com>, August 19, 2024

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## CHEMICAL R&D

### New Membrane Technology for more Effective and Efficient Water Purification Systems

A team of NYU Abu Dhabi (NYUAD) researchers has developed a novel approach that utilizes microwave technology to more easily synthesize and fine-tune a new type of membrane which effectively purifies water from a wide range of contaminants.

The membrane synthesis technique takes a few minutes, making it one of the fastest methods for creating covalent organic framework (COF) membranes. These membranes act as filters in devices designed to clean polluted water from specific contaminants, allowing its reuse in different applications an important discovery at a time when efficient wastewater treatment becomes vital in a world threatened by water scarcity. The new type of dual-faced membrane, characterized by its unique superhydrophilic and near-hydrophobic surfaces, enables efficient removal of contaminants like oils and dyes from water. This dual functionality not only enhances the filtration process but also endows the membranes with strong antibacterial properties, crucial for long-term usability and effectiveness.

Published in the *Journal of the American Chemical Society*, the study titled "Tunable Wettability of a Dual-Faced COF Membrane for Enhanced Water Filtration" presents this novel approach developed by Farah Benyettou and Asmaa Jrad under the leadership of Ali Trabolsi, Professor of Chemistry and Co-Principal Investigator at the NYUAD Water Research Center. The team's method involves a one-step microwave-mediated synthesis that occurs at the liquid-water vapor interface, allowing precise control over the membrane's properties without the need for subsequent modifications. "By fine-tuning the reaction time, we can adjust the membrane's thickness and its hydrophilic and hydrophobic characteristics," explained Benyettou. "This capability allows us to tailor the membrane specifically for various types of water pollutants, significantly enhancing both the efficiency and speed of water purification," explained Jrad.

The COF membranes developed by the NYU Abu Dhabi team demonstrate superior performance in removing oil from oil-in-water mixtures and boast exceptional water flux due to their multilayered structure and consistent porosity. Furthermore, these membranes outperform traditional polymeric ones in resisting organic fouling, a common challenge in membrane-based water filtration systems.

This technology represents a significant leap forward in the synthesis of high-quality, crystalline, free-standing COF membranes.

<https://phys.org/news>, August 8, 2024

## ENERGY

### New Graphene Technology Could Revolutionize Battery Safety and Performance

Researchers from Swansea University and collaborators have developed a scalable method for producing defect-free graphene current collectors, significantly enhancing lithium-ion battery safety and performance. These graphene foils offer exceptional thermal conductivity and durability, reducing the risk of thermal runaway and improving battery efficiency, especially in electric vehicles.

Researchers at Swansea University, in partnership with Wuhan University of Technology and Shenzhen University, have developed an innovative method for manufacturing large-scale graphene current collectors. This breakthrough promises to significantly enhance the safety and performance of lithium-ion batteries (LIBs), addressing a critical challenge in energy storage technology. Published in *Nature Chemical Engineering*, the study details the first successful protocol for fabricating defect-free graphene foils on a commercial scale. These foils offer extraordinary thermal conductivity up to  $1,400.8 \text{ W m}^{-1} \text{ K}^{-1}$  nearly ten times higher than traditional copper and aluminium current collectors used in LIBs.

"This is a significant step forward for battery technology", said Dr. Rui Tan, co-lead author from Swansea University. "Our method allows for the production of graphene current collectors at a scale and quality that can be readily integrated into commercial battery manufacturing. This not only improves battery safety by efficiently managing heat but also enhances energy density and longevity". One of the most pressing concerns in the development of high-energy LIBs, especially those used in electric vehicles, is thermal runaway a dangerous scenario where excessive heat leads to battery failure, often resulting in fires or explosions. These graphene current collectors are designed to mitigate this risk by efficiently dissipating heat and preventing the exothermic reactions that lead to thermal runaway.

The newly developed process is not just a laboratory success but a scalable solution, capable of producing graphene foils in lengths ranging from meters to kilometers. In a significant demonstration of its potential, the researchers produced a 200-meter-long graphene foil with a thickness of 17 micrometers. This foil retained high electrical conductivity even after being bent over 100,000 times, making it ideal for use in flexible electronics and other advanced applications. This new approach also allows for the production of graphene foils with customizable thicknesses, which could lead to even more efficient and safer batteries.

<https://www.sciencedaily.com>, August 29, 2024

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## SCIENCE AND SOCIETY

### Women in global Fisheries Industry fall through the safety net

Millions of women who work in the fisheries industry are being left behind as technologies develop to counter the effects of climate change and economic pressures. A new study examines this global problem and suggests ways forward in policy, research and practice research led by the University of East Anglia (UEA) looks specifically at post-harvest fisheries and aquaculture, where women constitute 50 per cent of the total workforce. Despite their significant contributions women often remain invisible, are unpaid or underpaid, their work seen as an extension of household work.

The findings, 'A systematic review of the impact of post-harvest aquatic food processing technology on gender equality and social justice' has been published in *Nature Food* in August.

Fisheries and aquaculture are an important source of livelihood, food and nutrition for many of the world's poorest, supporting worldwide about 67 million people directly and about 492 million people indirectly. Fisheries and aquaculture provide about 17 per cent of animal-source protein for human consumption, yet more than a third of global fisheries and aquaculture harvest is lost or wasted.

Prof Nitya Rao, UEA Professor of Gender & Development and Director of the Norwich Institute for Sustainable Development, is the lead author. She said: "Given the large number of people, in particular women, engaged in post-harvest activities globally, this review sought to better understand how processing technology and technical change have impacted those engaged in this sector, and how labour, resources, power and decision making are influenced and change in this process.

"In the context of climate change and other economic pressures, we are witnessing a rapid development of post-harvest technologies to enhance productivity and efficiency, reduce loss and waste, and ensure quality. Yet without addressing the social justice dimensions of these changes, there is a risk that this may exacerbate pre-existing and persistent inequalities". Women are disadvantaged across both traditional and improved technologies, especially regarding control over resources. Women are often unable to access social protection benefits including minimum wages, health insurance, housing and transport, due to their concentration at the lower levels of the labour hierarchy. As enterprises expand and adopt more capital-intensive technologies, women frequently report less agency and lower equity outcomes due to a combination of resource constraints, individual characteristics such as education, social norms and care responsibilities.

In the larger-scale, factory-based settings using advanced technologies, women and migrant workers tend to have lower status; often temporary, lower-paid jobs that are culturally stereotyped as 'women's work'; experience gender pay gaps, lack of access to worker rights and managerial roles; and are exposed to occupational health hazards. Labour divisions are stark, reinforced by social norms.

The research team, which included other UEA and Norwich Institute for Sustainable Development colleagues, reviewed 42 studies covering 55 locations in India, Bangladesh, Cambodia, Philippines, Japan, Canada, USA, Mexico, Brazil, Norway, Ghana, Nigeria, Tanzania and Zambia.

'A systematic review of the impact of post-harvest aquatic food processing technology on gender equality and social justice', is published 27 August 2024 in *Nature Food*.

The review makes several recommendations for policy, research and practice:

- The focus of fisheries' policymaking needs to embrace the entire aquatic food system, moving beyond capture fisheries and aquaculture to post-harvest processing, storage and consumption.
- More rigorous and comparative research is needed to examine the impacts of a range of technologies on different groups of people including women and men, young and elderly, migrant and non-migrant, and formally consider intersectionality.
- Diverse voices, especially women's and migrant worker voices, should have a place in policymaking and investment decisions around post-harvest processes at local, national and global levels in the process of developing and rolling out improved technologies.

<https://www.sciencedaily.com>, August 27, 2024

## Meetings and Visits of Director General, NAM S&T Centre

### **Meeting with Dr. D. Srinivasa Reddy, Director, CSIR-Indian Institute of Chemical Technology (IICT), Hyderabad, India**

Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre visited CSIR-IICT, Hyderabad on 27<sup>th</sup> August 2024 and met Dr. D. Srinivasa Reddy, Director, IICT and his senior colleagues Dr. D. Shailaja, Chief Scientist and Chair, Business Development and Research Management Division and others.

Dr. Bandopadhyay presented the vision and missions of the NAM S&T Centre as well as an overview of various Scientific Activities including International Workshops /Conferences, Training Programmes /Training Workshops in the areas of relevance to the developing world; publication of Books, Monographs and Fact Files; Fellowship Programmes and other initiatives.



Previous collaborations between CSIR-IICT and NAM S&T Centre were also recalled, highlighting major past events, such as Virtual Training Programme on “**Generic Drugs**” that was organized jointly on August 19, 2000. Additionally, several scientists from CSIR-IICT have attended various workshops/conferences organized by the NAM S&T Centre.



Dr. Bandopadhyay discussed the possibility of organizing an International Conference on “**Generic Drugs**” in the first quarter of 2026 with CSIR-IICT as the host institute. This was agreed by Dr. Reddy. The Organic Synthesis and Process Chemistry (OSPC) Department of CSIR-IICT will coordinate the proposed Joint International Conference.

### **Meeting with the Faculty Members from the Faculty of Science, Universiti Putra Malaysia (UPM) in Seri Kembangan, Malaysia**

Dr. Amitava Bandopadhyay, Director General, NAM S&T Centre visited Universiti Putra, Malaysia on September 13, 2024 and addressed faculty members from the Faculty of Science, UPM. The talk was titled “*Crafting Collaborative Partnerships in Joint Publications*” which was

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attended by about 30 faculty members. He pointed out that most of the publications by the NAM S&T Centre address key issues faced by the countries from the Global South and aligns with the UN Sustainable Development Goals. The meeting was arranged by Prof. Dr. Mohd. Basyaruddin Abdul Rahman, Chair, ISTIC Governing Board and Senior Professor of Chemistry, Universiti Putra, Malaysia.

Dr. Bandopadhyay further highlighted that these publications cater to a broad audience including scientists, technologists, policy makers and other stakeholders. NAM S&T Centre is currently publishing the books/monographs through renowned academic and research publisher Springer Nature, Singapore. Many of the Faculty Members showed keen interest in taking up joint publication project with the NAM S&T Centre.



**CRAFTING COLLABORATIVE PARTNERSHIPS IN JOINT PUBLICATIONS: EDITOR AND AUTHOR GUIDELINES WITH NAM S&T CENTRE AND ISTIC-UNESCO**

**13TH SEPTEMBER 2024**  
(FRIDAY) 10.00 AM  
102 Room, 1st Floor, Blok A1, Faculty of Science, Universiti Putra Malaysia

Publications by the NAM S&T Centre address key SDG issues faced by the countries from the Global South, other engaging with the Sustainable Development Goals (SDGs) for 2030. These works cater to a broad audience, including scientists, policymakers, and stakeholders. Many of the Centre's publications are released through the prominent academic publishers, e.g. Springer Nature.

SCAN HERE FOR ATTENDANCE

Dr. Amitava Bandopadhyay  
Chair of NAM S&T Centre, Faculty of Science, Universiti Putra Malaysia

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



**Dr. Moursi Hosni Ali Abubieh**, a researcher from the Photochemistry Department at the Chemical Industries Research Institute, National Research Center (NRC), Cairo, **Egypt**, was sponsored by the NAM S&T Centre under its Joint NAM S&T Centre – JSS AHER, Mysuru, India Fellowship Programme for the year 2024 to carry out research on **“The Preparation and Characterization of different types of Laboratory-Prepared Doped Titania Photocatalysts for Pharmaceuticals Degradation”**. This project was conducted under the guidance of Prof. Dr. K. Gowthamarajan at the Department of Pharmaceutics, JSS College of Pharmacy, Ooty, Tamil Nadu, India, from May 2 to June 20, 2024.

The primary aim of this research was to prepare and analyze doped Titania nanoparticles for their photocatalytic activity in degrading pharmaceuticals found in wastewater. The objectives included the characterization of laboratory-prepared doped Titania samples, assessment of photocatalytic efficiency and structural properties, and exploration of collaboration opportunities in drug delivery and design.

During the fellowship, Dr. Abu Bieh engaged in multiple analytical techniques, including particle size distribution and zeta potential measurements, conducted using the Kalliope Scientific Instrument. The results indicated significant variations in particle sizes among the prepared samples. Initial attempts to assess the thermal properties of the samples using Differential Scanning Calorimetry (DSC) faced challenges due to high melting points. Fourier Transform Infrared (FT-IR) Spectroscopy was used to identify functional groups and assess photocatalytic activity, while Near-Infrared Spectroscopy investigated the effects of UV exposure on the physical properties of the samples. Additionally, Dr. Abu Bieh assisted in calibrating and measuring metal oxide samples using Atomic Absorption Spectroscopy for further analysis.

Throughout the fellowship, Dr. Abu Bieh actively participated in workshops and discussions with faculty and peers, enhancing his understanding of molecular dynamics and drug formulation. Notably, he attended a workshop on space medicine, which opened avenues for future collaboration in space-related pharmaceutical research. The fellowship culminated in a fruitful exchange of ideas and research strategies with Prof. Dr. Gowthamarajan, solidifying plans for ongoing collaboration in photocatalytic materials and pharmaceutical applications. Dr. Abu Bieh expressed gratitude for the support and resources provided by JSS College of Pharmacy, acknowledging the hospitality and guidance from faculty members throughout his stay. He extends his heartfelt thanks to the NAM S&T Centre, JSS AHER, and the faculty and staff of JSS College of Pharmacy for their invaluable support during his research fellowship.




## New Publication

# Emerging Trends in Leather Science and Technology

Sreeram Kalarical Janardhanan  
Luis A. Zugno *Editors*

## Emerging Trends in Leather Science and Technology

 Springer

Leather and its products are one of the most traded goods globally due to their greater durability, good hydrothermal stability, good mechanical properties and resistance to chemical, biological and environmental degradation. The leather industry has emerged as a multi-billion dollar global business. However, leather manufacturing industry has faced criticism in the recent years due to concerns over animal welfare, severe environmental impacts and poor working conditions in some countries. In spite of the implementation of several advanced processing techniques and treatment systems, leather industry is still facing serious challenges from the public and the government authorities. There is an urgent need to revamp the existing leather processing methods for the sustainability of the leather industry in the future.

Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi has gone ahead to address the above mentioned issues by bringing out a Monograph entitled **Emerging Trends in Leather Science and Technology**. The monograph through its seventeen chapters contributed by scientific community across twelve countries underscores the various challenges and opportunities of leather manufacturing, product making, environmental management and policies regarding leather processing, which the developing world needs to understand, manage and improve in regard to its processing, manufacturing infrastructure and export requirements to achieve sustainability. The book intends to provide information on smart as well as sustainable leather manufacturing practices to the professionals from the developing countries.

The monograph would serve as a valuable resource material for scientists and researchers from R&D institutions, professionals from the leather sector, technical institutions, government officials, policymakers engaged in the area of leather science and technology.

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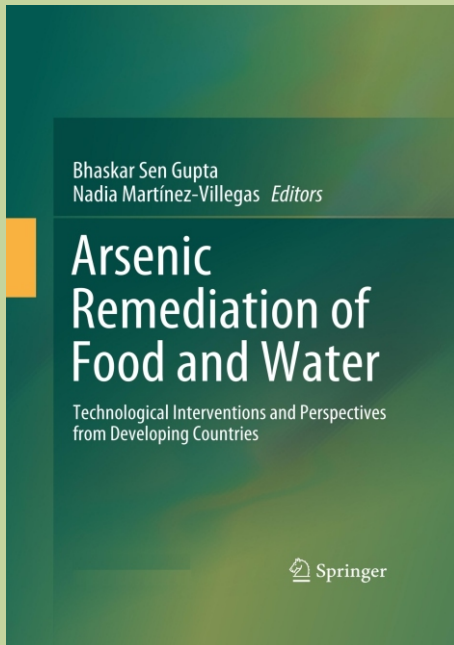
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## New Publication

# Arsenic Remediation of Food and Water - Technological Interventions and Perspectives from Developing Countries



Arsenic is naturally present in the groundwater. It is highly toxic in its inorganic form and exposure to high levels of arsenic poses a serious threat to the public health. Arsenic contamination of groundwater is widespread and there are a number of developing countries in which the arsenic contamination of drinking water is above the prescribed limit by WHO. The presence of arsenic in some groundwater sources has resulted in chronic arsenic poisoning around the world causing severe health hazards.

Considering the importance of the subject and to address the serious issue of arsenic contamination in developing countries, the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi has brought out this book titled *Arsenic Remediation of Food and Water - Technological Interventions and Perspectives from Developing Countries*. The book highlights the current status of arsenic contamination of water, related health hazards and the state of sustainable and cost-effective technological solutions for removing arsenic from groundwater in developing countries. The book comprises twenty two chapters contributed by leading experts and professionals from nine countries.

This book would be a valuable reference material for the scientific community in developing countries working on community water supply and treatment, food safety, public health and policy.

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5. Systematic Review of Arsenic Contamination, Toxicity and Remediation Techniques in Malawi, *Ibrahim Chikowe, Bonface Mwatope, Ulemu Kankwatira, Henry Phiri, George Chirambo, and Collins Edward Jana*
6. Groundwater Arsenic Contamination in Karimpur-I Block, District Nadia, West-Bengal and Investigation for Safe Water Option, *Bhaskar Das, Somil Thakur, and Sanjana Chakraborty*
7. Arsenic Contamination of Water Sources in Southern Africa: Role of Artisanal and Small Scale Mining Sector, *Xavier Poshiwa*

8. Source Apportionment of Heavy Metal(loid)s in the Surface Soils of Cerrito Blanco, Mexico: A Comparative Study of Three Receptor Models (APCS-MLR, PMF and UNMIX Model), *Arnab Saha, Bhaskar Sen Gupta, Sandhya Patidar, and Nadia Martínez-Villegas*

## Part II Process Development for Arsenic Removal from Groundwater

9. Polymer Nanofilm Composite Membranes for Ionic and Molecular Separation: History, Challenges and Future Perspectives, *Pulak Sarkar and Santanu Karan*
10. Novel Cellulose-Based Hectocycle Nanopolymers for Arsenic Removal from Groundwater, *Bayan Khalaf, Shehdeh Jodeh, and Subhi Samhan*
11. Investigation of Physicochemical Characteristics for Alumina Selection for Fluoride and Arsenic Removal, *Rajendra S. Thakur, Payal A. Kaneria, Anil R. Gupta, and Saroj Sharma*
12. Arsenic Remediation from Water in Burkina Faso Using Local Materials as Adsorbents: Overview, Mitigation and Prospects, *Yacouba Sanou*

## Part III Technological Interventions

13. Arsenic and Iron Removal from Groundwater Using Indigenously Developed Ceramic Membranes, *Swachchha Majumdar, Subhendu Sarkar, Ganesh Chandra Sahoo, Sudhendu Sensarma, and Sibdas Bandyopadhyay*
14. An Overview of the Strategies to Mitigate Arsenic in Deltaic Aquifers, *Surajit Chakraborty, Utsab Ghosal, and Srijita Ghosh*
15. A Chemical and Waste-Free Community Plant for Treating Arsenic-Contaminated Water in Tepul Village, North 24 Parganas, West Bengal, *Bhaskar Sen Gupta, Isita Sen Gupta, Soumyadeep Mukhopadhyay, Joey Sen Gupta, Nibedita Chatterjee, and Chanchal Majumder*
16. Performance Evaluation of a Subterranean Arsenic Removal (SAR) Community Water Treatment Plant: A Sustainable Long-Term Approach to Removing Arsenic from Drinking Water, *Bhaskar Sen Gupta, Isita Sen Gupta, Soumyadeep Mukhopadhyay, Sumona Mukherjee, Debra Helen Phillips, Amitava Bandopadhyay, and Arup K. Sen Gupta*

## Part IV Arsenic Contamination in Water and Food Chain

17. Remedial Approaches to Arrest Arsenic in Soil–Plant System to Prevent Its Entry in Rice Grain—a Review, *Urvashi Lama, Sharmistha Majumder, Deepanjan Mridha, and Tarit Roychowdhury*
18. Arsenic in Groundwater: A Threat to Agriculture and Its Mitigation Measures to Protect the Food Chain, *Pankaj Kumar Srivastava, Mariya Naseem, and Richa Raghuwanshi*
19. Arsenic Contamination in Groundwater and Food and Remediation Measures in Myanmar, *Mya Thandar Khin and Phyto Wai*
20. Arsenic Toxicity: Contamination Through Groundwater and Food Chain and Role of Genetic Factors, *Payel Singh, Subhamoy Bhowmick, Debashis Chatterjee and Sreemanta Pramanik*
21. Transfer of Arsenic in Food Chain Through Groundwater Irrigation: A Threat to Food Safety and Human Health, *Shepherd Manhokwe, Victor Nyanhete, Rudo Natasha Mugadza, Ruth Nyoka and Patience Marume*

## Part V Effect of Arsenic Contamination on Human Health

22. Arsenic Contamination of Groundwater and Its Impacts on Health, *Kunal Kanti Majumdar*

## Centre Announces

### JOINT NAM S&T CENTRE - ZMT BREMEN (GERMANY) FELLOWSHIP PROGRAMME ON “BLUE ECONOMY IN TROPICAL COASTAL MARINE RESEARCH” CALL FOR APPLICATIONS FOR 2025

The Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) is pleased to invite applications from suitable candidates for the “**Joint NAM S&T Centre - ZMT Bremen (Germany) Fellowship Programme**” on *Blue Economy in Tropical Coastal Marine Research* for the year 2025.

This Fellowship Programme was initiated in January 2008 for the affiliation of scientists from Developing Countries with the *Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany* for a period of up to 3 months to work with its Senior Researchers and Faculty Members for upgrading research skills in the fields related to Ecology, Biogeochemistry, Geology, Theoretical Ecology and Modelling, Social Sciences and Tropical Coastal Marine Systems by undertaking short-term joint Research Projects at ZMT, Bremen.

Proposals in the area of '**Blue Economy**' are highly encouraged in order to strengthen research on solutions. Depending on the research topic, the selected scientists can also benefit from the ZMT's association with Bremen University and other well-established marine research institutes in Bremen.

The Fellowship will be awarded to the scientists **only from the Member Countries of the NAM S&T Centre and NAM S&T–Industry Network Members** and only one scientist may be selected from a particular Country/Network Member. The NAM S&T Centre sponsors up to five scientists each year for the fellowship. While the Centre will cover the international airfare of the selected scientists from its eligible Member Countries and Network Members and ZMT will provide them a monthly subsistence allowance of 1250 Euros to meet the accommodation and other expenses in Bremen.

Application recommended by the parent institution of the applicant and endorsed by the Focal Point of the NAM S&T Centre in the country/organization of the applicant may be submitted to the Centre by e-mail in the relevant format. To facilitate collaboration, it will be necessary to have a support letter from the Scientific Workgroup Leader, Senior Scientist or Scientific Director at ZMT who would host the fellow. You can find a list of work group leaders under each scientific department under this link (<https://www.leibniz-zmt.de/en/research/scientific-departments.html>).

Details on guidelines of the Fellowship and the application form are available at the Centre's Website: [www.namstct.org](http://www.namstct.org).