



## Science Diplomacy Alert

*A Fortnightly newsletter on S&T, Science Policy and Diplomacy*

### Focus

### Ease of Doing Research: The Pathway for Addressing Future Challenges



There is a need to create systems to overcome hurdles faced by researchers by giving more flexibility to research institutes, as permissible within host institute norms. The overarching aim is to improve science and innovation outputs, not only in publications but also in translating research and practical solutions that drive economic growth, enhance national security, and achieve technological leadership. S K Varshney writes

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## SCIENCE POLICY & DIPLOMACY

### International S&T Cooperation



#### Indonesia to Cooperate with EU in Research Innovation, Science and Technology

It aims to increase researchers' involvement in the Horizon Europe program, which offers opportunities for building international partnerships, accessing advanced research facilities, as well as contributing to solutions to global challenges.

#### India–Japan to Deepen Agri-Tech Ties

On June 17, Japan's Consulate General visited ICAR-CCRI Nagpur to enhance cooperation in citrus research, focusing on climate-smart farming and innovation transfer.

#### Axiom 4 Launches International Mission to ISS

SpaceX Falcon 9 and Crew Dragon "Grace," lifted off from Kennedy Space Center, carrying a crew from the United States, India, Poland and Hungary for a two-week stay at the ISS, performing dozens of experiments.

#### UAE Deepens Strategic Partnership with Germany

The visit focused on strengthening bilateral relations in critical, emerging, and advanced technologies, while expanding strategic collaboration in science, innovation, and advanced technology.

#### India-Ukraine Joint Working Group Meeting on Agriculture

Both countries discussed key issues related to cooperation in horticulture, technology transfer, knowledge sharing, capacity building, research collaboration and market access,

marking an important milestone in strengthening bilateral cooperation in agriculture and allied sectors.

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## Emerging Tech & Governance



### **\$348 Million Allocated by Norrskén to Foster 'AI for Good'**

Sweden's Norrskén Foundation has committed 300 million euros (\$348 million) to investing in European startups that are using 'AI for good' for solving challenges in climate, health, food, education and society.

### **HCLTech Partners with AMD to Launch Global Innovation Labs**

HCLTech has teamed up with AMD to establish a network of joint innovation labs worldwide. This collaboration aims to boost data-center and cloud infrastructure performance, enhance scalability, and deliver cost-optimized solutions tailored to enterprise needs

### **UK to Invest £500mn in Quantum Computing**

In its industrial strategy, the UK government will invest more than £500mn in quantum computing over the next four years and a total of £670mn over the next 10 years.

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## Events & Meetings



### **UNESCO Hosts Global Tech Diplomacy Forum**

The Forum brought together world leaders, tech innovators, policymakers, and stakeholders to discuss and shape the future of global digital governance. The key themes included digital sovereignty and global governance; AI and Ethics in international relations; cybersecurity and international cooperation; and bridging the digital divide.

## INDIAN SCIENCE NEWS

### **Eco-Friendly Water Purifier Uses Sunlight, Vibration & AI**

Institute of Nanoscience and Technology (INST), Mohali designed a 3D-printed scaffold made from biodegradable polylactic acid (PLA) which has piezo-photocatalytic properties, and is biodegradable, eco-friendly, low-cost and reusable. It is ready for adaptation in various industries and remote communities

### **TDB Supports BatX Energies to Scale Indigenous Battery Recycling Tech**

The project focuses on the commercialisation of an indigenous, sustainable battery recycling process to extract battery-grade lithium, cobalt, nickel, and manganese from end-of-life lithium-ion batteries.

### **India's Solar-Powered Water Splitting Paves Way for Green Hydrogen**

The device achieved an excellent surface photovoltage of 600 mV and a low onset potential of around 0.11 VRHE, making it highly effective at generating hydrogen under

solar energy. It showcased long-term stability, operating over 10 hours in alkaline conditions with only a 4 per cent performance drop.

### **Nano-Cups Designed to Burn Cancer Cells**

Researchers have developed a novel one-step colloidal synthesis method for fabricating PEGylated semi-shells (SS) with nano-cup morphology at room temperature. The procedure improved survival rate and minimised tumour relapse in preclinical mice.

### **Policy Reforms for ‘Ease of Innovation’ and ‘Ease of Doing Research’**

These changes are expected to significantly reduce delays in research projects, improve access to high-end equipment, and motivate young scholars, start-ups, and innovators.

### **ICMR Launches Portable Kit for 100 per cent Accurate Nipah Detection**

It is a portable, colorimetric RT-LAMP assay kit for swift, on-site detection of the Nipah virus with near-perfect accuracy, requiring minimal equipment. With ICMR inviting firms for technology transfer, the kit is moving toward commercial production—offering a low-cost, battery-free option ideal for deployment in remote and resource-limited settings.

### **S&T Cluster Report Released**

Outcomes include the deployment of EV charging infrastructure in Delhi/NCR, launch of AR/VR-enabled artisan marketplace, “One Delhi” digital transit app, as well as health-tech solutions, One Health initiatives, e-waste management systems, and the development of pacemaker leads at AMTZ Vizag.

## **ADVANCES IN S&T**

### **Nanodomains Hold Key to Next-Generation Solar Cells**

**The problem:** Perovskite solar cells, though highly efficient, suffer from instability due to unknown nanoscale structural fluctuations. These dynamic distortions limit performance and lifespan, hindering commercial scalability.



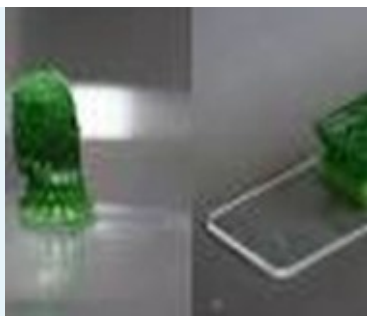
**The Method:** Dynamic nanodomains within lead halide perovskites hold a key to boosting their efficiency and stability. The findings reveal the nature of these microscopic structures, and how they impact the way electrons are energized by light and transported through the material, offering insights into more efficient solar cells. By understanding the behavior of these nanodomains, engineers could fine-tune the properties of perovskites to improve the performance and longevity of solar cells.

**Future Prospects:** This can help accelerate the development of perovskite-based solar technologies and make them a more viable solution for the global push towards renewable energy. By advancing the understanding of materials like lead halide perovskites, the team aims to address global challenges in renewable energy sources like solar power.

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### **3D-Printed Living Material that Captures CO<sub>2</sub> from Air Developed**

**The Problem:** Conventional building materials like concrete are major CO<sub>2</sub> emitters and lack active carbon



sequestration capabilities. There's a critical need for sustainable construction materials that both build structures and capture carbon from the air.

**3D-Printable Living Hydrogel:** ETH Zurich researchers created a 3D-printable living hydrogel infused with cyanobacteria that grow and fix CO<sub>2</sub> through photosynthesis. The bacteria also biomineralized carbonate minerals within the gel, transforming soft material into a hardened, self-reinforcing structure. The bacteria use sunlight to produce biomass and simultaneously trigger mineral formation, which locks carbon away in a stable form. Engineered hydrogels provide an ideal habitat for these microbes, allowing them to thrive for over a year.

**Future Prospects:** Lab tests showed continuous CO<sub>2</sub> capture over 400 days, sequestering ~26 mg CO<sub>2</sub> per gram—surpassing recycled concrete. Demonstrations in Venice and Milan suggest these living materials could be used in building facades, turning structures into long-term carbon sinks.

## INSIGHTS & RESOURCES

### Sustainable Development Report 2025

This year marks the 10th anniversary of the adoption of the Sustainable Development Goals (SDGs) and the 10th edition of the Sustainable Development Report (SDR) was launched on 24 June. Key findings of this year's report includes:

- 190 out of 193 countries have presented national action plans for advancing sustainable development. These UN member states have participated in the Voluntary National Review (VNR) process, presenting their SDG implementation plans and sustainable development priorities to the international community.
- East and South Asia has outperformed all other regions in SDG progress since 2015. On average, East and South Asia has shown the fastest progress on the SDGs since 2015, driven notably by rapid progress on the socioeconomic target. In this year's SDG Index India (99) has entered the top 100 performers respectively
- Other countries that have progressed more rapidly than their peers include the following: Benin (Sub-Saharan Africa), Nepal (East and South Asia), Peru (Latin America and the Caribbean), the United Arab Emirates (Middle East and North Africa), Uzbekistan (Eastern Europe and Central Asia), Costa Rica (OECD), and Saudi Arabia (G20)
- Finland ranks first this year and 19 of the top 20 countries are in Europe. Yet even these countries face significant challenges in achieving at least two goals, including those related to climate and biodiversity.
- On average globally, the SDGs are far off-track. At the global level, none of the 17 goals are currently on course to be achieved by 2030. Conflicts, structural vulnerabilities, and limited fiscal space impede SDG progress in many parts of the world. But while only 17 percent of the targets are on track to be achieved worldwide, most UN member states have made strong progress on targets related to access to

basic services and infrastructure, including mobile broadband use (SDG 9), access to electricity (SDG 7), internet use (SDG 9), under-5 mortality rate (SDG 3), and neonatal mortality (SDG 3)

- For many developing countries, a lack of fiscal space is the major obstacle to SDG progress, as they cannot invest adequately in sustainable development due to debt burdens and a lack of access to affordable, long-term capital. Global public goods are vastly under-financed.

## Top 10 Emerging Technologies 2025

The report developed by the World Economic Forum in collaboration with Frontiers, highlights 10 innovations with the potential to reshape industries and societies. The top ten technologies discussed in the report are:

- **Structural Battery Composites** combine energy storage and structural strength in a single material, reducing weight and improving efficiency in vehicles and aircraft. Though still emerging, SBCs offer major sustainability and cost benefits. Challenges remain in performance, safety and regulation before widespread adoption can be achieved.
- **Osmotic power** generate clean, steady energy from differences in water salinity using membranes. It offers promise for sustainable electricity, water purification and resource recovery, pending further investment and cost reduction.
- **Advanced nuclear technologies** are gaining momentum. Innovations like small modular reactors (SMRs) and next-gen cooling systems promise safer, cheaper, and scalable green energy.
- **Engineered living therapeutics** are modified microbes or cells that produce drugs inside the body, offering targeted, sustained treatment with lower costs and fewer side effects. Key challenges remain around safety, regulation and large-scale clinical approval.
- **GLP-1 drugs** originally for diabetes and obesity, show promise in treating Alzheimer's and Parkinson's due to their neuroprotective effects. More clinical trials and regulatory steps are needed to confirm effectiveness and accessibility.
- **Autonomous biochemical sensors** continuously detect health or environmental markers without human input, using wireless, self-powered systems. They offer real-time monitoring for applications like glucose tracking or pollution detection. Key challenges include sensor lifespan, cost and regulatory concerns around engineered organisms.
- **Green nitrogen fixation** aims to reduce the high carbon footprint of conventional ammonia production, essential for global food supply. While still early-stage, these innovations could localize production and decarbonize agriculture and shipping.
- **Nanozymes** are synthetic nanomaterials that mimic natural enzymes, offering greater stability, lower costs and broader functionality. With a projected \$57.95 billion market by 2034, commercialization is accelerating despite regulatory and technical hurdles.

- **Collaborative sensing** connects everyday sensors across homes, cities and vehicles into AI-powered intelligent networks. These systems enable real-time, shared decision-making for applications like traffic control, environmental monitoring, and autonomous vehicles. Key challenges include data privacy, power constraints, and developing multi-modal algorithms for seamless sensor integration.
- **Generative AI watermarking** embeds invisible markers in text, images, audio and video to verify authenticity and trace origins. As AI content proliferates, these technologies help combat misinformation and protect intellectual property. While adoption is growing, challenges like evasion, lack of standards and ethical concerns still need resolution.

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