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India Sets Up First CCU Innovation Cluster to Decarbonise Cement Industry

The CCU testbeds enable the cement industry to capture and convert CO₂ into valuable products, reducing emissions while strengthening competitiveness. Chemicals, fertiliser, power, and construction industries can leverage these innovations to make their operations more sustainable and cost-effective.

India has launched its first national cluster of Carbon Capture and Utilisation (CCU) testbeds specifically targeting the cement industry one of the hardest sectors to decarbonise. Spearheaded by the Department of Science and Technology, five testbeds have been set up in partnership with premier academic institutions and major cement manufacturers under a Public-Private Partnership (PPP) model. These include pilot plants at IIT Kanpur, IIT Bombay, IIT Madras, CSIR-IIP, and the National Council for Cement and Building Materials, tackling technologies like oxygen-enhanced calcination, mineralisation, catalyst-based CO₂ capture, and vacuum swing adsorption. The initiative aligns with India's 2070 Net Zero goal, and aims to turn captured CO₂ into valuable products like olefins, concrete blocks, and construction materials. Announced on National Technology Day 2025, the testbeds also serve as scalable demonstration projects for wider industry adoption.

In this newsletter
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updates from:

Government Initiatives

Health and Medicine

Emerging Technologies

Environmental Science

Space Exploration

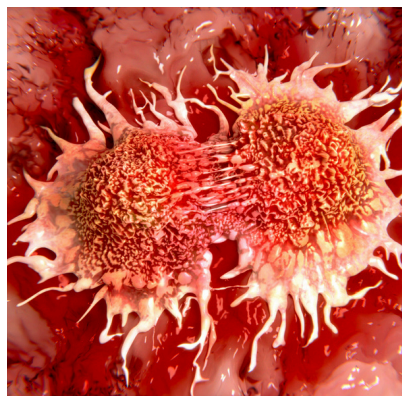
Food and Agriculture



UK's 86 billion Euro Science Push to Fuel Industry-Led Innovation Across Regions

This investment will accelerate industry-led R&D in semiconductors, defence, diagnostics, and AI sectors, enabling regional businesses to scale innovations faster. It also enhances collaboration between academia and manufacturers, opening new supply chains and export opportunities.

Under its Modern Industrial Strategy, the UK Government has unveiled an 86 billion Euro science and technology funding plan, with annual R&D spending reaching 22.5 billion Euro by 2029/30. Targeting key sectors, the initiative includes 500 million Euro for regional innovation clusters and at least 30 million Euro each for England's seven Mayoral Strategic Authorities, plus funds for Scotland, Wales, and Northern Ireland. A new Local Innovation Partnerships Fund will empower regional leaders to shape R&D agendas. Early-stage government R&D investments have previously shown a 20% boost in jobs and company turnover. The strategy also includes a 4.8 million Euro collaboration between Cambridge and Manchester to pilot scalable growth models.



New Study Links Oleic Acid to Fat Cell Growth

The pharmaceutical and nutraceutical industries can develop targeted supplements or functional foods that balance fatty acid compositions, while food testing companies can offer specialised oleic acid analysis services to help brands optimise their formulations for better health outcomes.

A study published in Cell Reports reveals that high intake of oleic acid, a monounsaturated fat abundant in olive oil, may stimulate excess fat cell production, potentially fueling obesity. Researchers from the University of Oklahoma and Yale University found that oleic acid uniquely triggered the proliferation of precursor fat cells by activating AKT2 and suppressing LXR, unlike other fats from coconut oil, milk, or soybean oil. In mouse models, this led to rapid fat cell expansion and increased storage of dietary nutrients, heightening risks of cardiovascular disease and diabetes. The findings suggest that rising oleic acid levels in modern diets, especially processed food, may contribute to metabolic disorders.



New mRNA Platform Cuts Vaccine Cost and Boosts Viral Coverage

Pharmaceutical and biotech industries can leverage this low-dose, broad-spectrum mRNA platform to develop faster, cheaper vaccines during pandemics, improving supply chain efficiency and global reach. It opens up market opportunities for next-gen vaccines against bird flu, COVID variants, and other emerging RNA viruses.

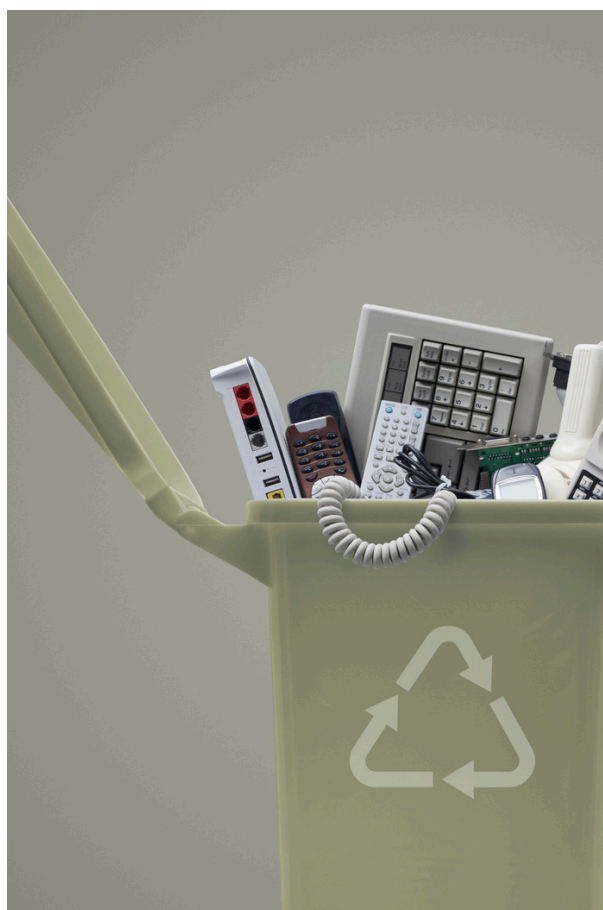
A study published in npj Vaccines by researchers from the University of Pittsburgh School of Public Health and Pennsylvania State University introduces a low-cost, scalable mRNA vaccine platform targeting fast-mutating viruses like SARS-CoV-2 and H5N1. The "trans-amplifying" approach separates the mRNA into two parts- antigen and replicase, enabling stockpiling of the replicase and rapid response when new variants emerge. Using a consensus spike protein, the vaccine offers broad protection across strains. In mouse trials, it triggered strong immune responses with 40 times less mRNA than current vaccines, reducing both cost and production time. This strategy promises a faster, more adaptable pandemic response and long-lasting immunity.



India's New Sodium-Ion Battery Promises Faster, Cheaper Energy for EVs and Grids

This innovation holds major potential for electric vehicle manufacturers, renewable energy storage providers, and drone technology firms by lowering battery costs and enabling safer, high-speed charging. It opens new manufacturing opportunities for energy tech and rural electrification firms across India.

Scientists at JNCASR, Bengaluru, have developed a new sodium-ion battery that charges up to 80% in just six minutes and lasts over 3,000 charge cycles, offering a cost-effective, fast-charging, and safer alternative to lithium-ion batteries. Using a novel NASICON-type anode material ($\text{Na}_{1.0}\text{V}_{0.25}\text{Al}_{0.25}\text{Nb}_{1.5}(\text{PO}_4)_3$) engineered through nanotechnology, they improved ion mobility by downsizing particles, applying carbon coating, and doping with aluminium. Sodium, being abundant and domestically available in India, makes this innovation ideal for reducing dependency on costly lithium imports. The battery has passed advanced electrochemical and simulation tests, showing both high performance and thermal stability.



Turning E-Waste into Smart Infrastructure: Old Phones Power Cities and Oceans

Marine research organisations and aquaculture industries can utilise underwater data processing capabilities for automated species monitoring and water quality assessment without expensive diving operations.

Researchers from the University of Tartu's Institute of Computer Science have developed a low-cost method to repurpose outdated smartphones into micro data centers, offering a sustainable solution to rising electronic waste. Over 1.2 billion smartphones are produced each year, many of which are discarded within 2-3 years. The team, led by Huber Flores and colleagues, removed batteries to prevent leakage, used external power, and assembled four phones into 3D-printed holders to build a prototype costing just €8 per device. These miniature centers successfully gathered real-time data in urban spaces like bus stops and were even tested underwater for marine species monitoring, replacing manual scuba-based data collection with automated processing.

Study Reveals How Air Pollution Alters Pregnancy Metabolism and Raises Preterm Birth Risk

These findings support the development of precision diagnostics and prenatal supplements in the healthcare and nutraceutical industries, targeting metabolic disruptions from pollution. They also enable pollution control and clean-tech companies to design filtration systems tailored for maternal health, creating new demand in urban health and maternity care markets.

A recent Emory University study involving 330 pregnant women in Atlanta found that exposure to fine particulate matter (PM2.5) in air pollution disrupts maternal metabolism, increasing the risk of preterm (under 37 weeks) and early term (37-39 weeks) births. Published in *Environmental Science & Technology*, the study identified specific metabolic pathways and molecules, such as cortexolone and lysoPE(20:3), linked to these risks. Around 20% of participants delivered preterm and 16.4% delivered early term, both higher than U.S. averages. PM2.5 exposure, largely from vehicles, industry, and wildfires, was found to affect energy, amino acid, and protein metabolism critical to fetal growth and immune development.



Rubin Observatory's Mega-Camera to Revolutionise Sky Mapping and Real-Time Space Monitoring

The space-tech and data analytics industries can harness Rubin's real-time cosmic event data for satellite safety, AI-based predictive modeling, and space debris management. Optical engineering and high-performance computing sectors will benefit from advances in fast data processing and ultra-high-resolution sensor development.

The USD 810 million Vera C. Rubin Observatory in Chile, equipped with the world's largest 3,200-megapixel digital camera, is set to transform astronomy by capturing the entire southern sky every 3-4 nights over a 10-year span. With each image covering an area equivalent to 45 full moons and repeated 800 times per location, the telescope will generate around 8 million real-time alerts per night for variable and transient cosmic events. Its compact, energy-efficient design allows it to reposition every 40 seconds using regenerative technology, despite its remote Andes mountain location. The observatory will support eight science teams working on areas like dark matter, galaxy mapping, and asteroid detection, starting with a global image reveal on June 23. Named after dark matter pioneer Vera Rubin, the observatory expands the space-time survey volume by 1,000 times compared to previous instruments.



Scientists Develop Enzyme-Based Tool to Protect Crops from Diseases, Boosting Agricultural Yields

The agricultural sector, particularly crop protection and seed biotechnology industries, will benefit from this innovation by gaining access to advanced disease-resistant traits in seeds or bio-based fungicides.

Researchers from Rutgers University and Brookhaven National Laboratory have decoded the structure and regulation of metacaspase 9, a plant enzyme that controls cell death to combat diseases. Using X-ray crystallography and computer modeling, they identified how the enzyme activates under acidic conditions, enabling them to design "super-active" variants that can trigger early cell death to stop biotrophic pathogens (like powdery mildew) or inhibitors to block necrotrophic infections (like white mold). This discovery, backed by a provisional patent, offers a safer, targeted alternative to traditional fungicides, reducing crop losses that cost agriculture USD 100–200 billion annually. The technology can be adapted into genetically modified crops or eco-friendly agrochemicals, providing long-term disease resistance.

Diverse Flavonoid-Rich Diet Linked to Longer Life and Reduced Disease Risk

Food, nutraceutical, and functional beverage industries can capitalise on this research by developing and marketing diverse flavonoid-enriched products that cater to growing health-conscious consumers. The study supports innovation in personalised nutrition and functional food formulation to promote disease prevention and longevity.

A large-scale study published in *Nature Food* and led by Queen's University Belfast, ECU Perth, and the Medical University of Vienna has found that consuming a variety of flavonoid-rich foods like tea, berries, apples, and dark chocolate significantly reduces the risk of major diseases such as cardiovascular disease, type 2 diabetes, cancer, and neurological conditions. Tracking over 120,000 participants aged 40-70 for more than a decade, the research showed that a daily intake of 500 mg of flavonoids lowered all-cause mortality risk by 16%. Those who consumed a wider range of flavonoid sources had even greater health benefits, highlighting that diversity of intake, not just quantity, is key. This reinforces the idea that eating a colorful and varied diet may lead to longer, healthier lives.





Microplastics in Farmland Pose Rising Risk, New Review Warns of Impact on Food and Human Health

Agrochemical and packaging industries can benefit from investing in bio-safe plastic alternatives to meet emerging sustainability regulations. The Smart Spray offers a market-ready, low-toxicity solution for water conservation in farming while reducing long-term soil contamination risks.

A review by Murdoch University has found that agricultural soils now contain 23 times more microplastics than oceans, with plastic residues carrying up to 10,000 largely unregulated chemical additives. These plastics, entering farmland via mulching, fertilisers, and even rainfall, have been detected in crops like lettuce, wheat, and carrots, raising serious concerns as micro- and nanoplastics are also being discovered in human organs, including the lungs and placenta. Additives such as BPA alternatives, phthalates, and flame retardants have been linked to endocrine disruption, reproductive issues, stroke risk, and early death. To tackle this, researchers at the Bioplastics Innovation Hub are developing safe, biodegradable plastics, including a new soil-safe Smart Spray that conserves water while avoiding long-term contamination.

Thank you for reading!

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