

Technology Roundup

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Forthcoming Tech Events

International Conference on Integrated
Flood Management under Changing
Climate Scenario

2nd International Industrial Chemistry
Conference

5th International Conference on
Robotics and Automation in Industry

International Conference on Renewable
Energy and Advanced Materials

2nd International Conference on
Zoological Emerging Scientific Trends

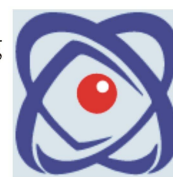
2nd International Conference on Energy,
Power, Environment, Control, and
Computing

Pre Conference Workshop on
Understanding
Challenges to Livestock of Pakistan
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National Center of Industrial Biotechnology Inaugurated by President

President of Pakistan Inaugurated the National Center of Industrial Biotechnology at the Pir Mehr Ali Shah Arid Agriculture University in Rawalpindi. The President said there will be abundance in alternate renewable energy, education, medicines and agriculture sectors in the days to come and we have to transform ourselves to fully utilize this abundance for better and bright future of the country. The President visited different stalls that displayed bio-technology and agriculture tools and products.

He urged the scientists and agriculture experts to take advantage from the latest technology for uplift of agriculture sector to meet demands of the country. According to the Vice Chancellor of Pir Mehr Ali Shah Arid Agriculture University, curriculum of the university is designed as per the needs of agriculture and industry and university has implemented international standards to uplift the quality of education.

The industrial biotechnology is an organization or a center for research facility that focuses on application of biotechnology and development techniques in industrial processes. Such research centers can play key role in bridging the gap between the industry and academia as well as modernization of both. At present, modern optimized agricultural techniques and efficient irrigation methods are of utmost importance. In this regard, best global agricultural practices and modern lab techniques in field of biotechnology can be followed as an analogue.



Image credit and source: <https://www.radio.gov.pk/20-01-2023/president-calls-for-utilizing-modern-research-based-technology-to-increase-agriculture-produce>

Pakistan and IAEA Accelerate Nuclear Cooperation to Address Climate, Food and Health

The Director General, International Atomic Energy Agency (IAEA), met with the country's leadership including, the Prime Minister and Foreign Minister and visited various nuclear facilities across the country, some of which he also inaugurated. Prime Minister Muhammad Shehbaz Sharif and Director General IAEA spoke on the worsening effects of climate change on Pakistan and how nuclear science and IAEA support is helping the country.

During the flood in year 2022, The IAEA and Food and Agriculture Organization of the United Nations (FAO), in coordination and consultation with Pakistani authorities developed an emergency support package to assist the country in applying nuclear science to better understand the flood's impact on soils, crops and the potential spread of animal and zoonotic diseases. In a meeting with Foreign Minister Bilawal Bhutto Zardari, DG IAEA, Mr. Grossi said opportunities for the peaceful use of nuclear science and technology in Pakistan were plentiful, emphasizing how nuclear applications and IAEA initiatives are addressing climate change and issues of access to cancer care.

Mr Grossi visited Chashma Nuclear Power Plant. Inaugurating the sites new spent fuel dry storage facility, Mr Grossi highlighted the importance of managing spent fuel safely and securely. Mr Grossi was welcomed at the Pakistan Institute of Nuclear Science and Technology (PINSTECH), an IAEA partner in work related to human health, nutrition and water analysis. At PINSTECH, Mr Grossi inaugurated a dosimetry laboratory. Mr Grossi also visited the Pakistan Centre of Excellence in Nuclear Security (PCENS), saying he was impressed by the high standard of the facility and that he looked forward to further collaboration. At the Nuclear Medicine Oncology and Radiotherapy Institute in Islamabad, Mr Grossi inaugurated Cyberknife, a new cancer treatment facility that he described as a milestone for the country.



Image credit and source: <https://www.iaea.org/newscenter/news/pakistan-and-iaea-accelerate-nuclear-cooperation-to-address-climate-food-and-health>

Pakistan Inaugurates 3rd Unit of Karachi Nuclear Power Plant

Prime Minister Shehbaz Sharif has inaugurated the third unit of the Karachi Nuclear Power Plant (KANUPP), which has 1.1GW of power generating capacity. The nuclear reactor will help the country cope with its ongoing energy crisis. The K-3 nuclear unit is expected to ease Pakistan's ongoing energy crisis.

With the commencement of commercial operations of K-3, the share of nuclear energy in overall generation from all resources at national level has significantly increased to over 9.1 percent. This share, which was 1.1 percent in 1990, has gradually and steadily increased in later years to 7.1 percent in 2020, before achieving the present level.

These nuclear power plants, established with technical and economic support of China, are owned and operated by the Pakistan Atomic Energy Commission (PAEC). In the vicinity of KANUPP, construction work on two nuclear power reactors i.e., K-2 and K-3, was started in August, 2015 and in May, 2016 respectively.

These units are based upon Chinese ACP1000 design that is a Generation-III version of the PWR (Pressurized Water Reactor) nuclear reactor technology. In this design, apart from other features, safety is significantly enhanced by using passive safety systems (no need of human action or input power for operation).



Image credit and source: <https://paec.gov.pk/NuclearPower/> and <https://www.thenews.com.pk/magazine/money-matters/941162-nuclear-power-generation>

IT Minister Inaugurates 2nd Digital School of Sindh in Hyderabad

Federal IT Minister Syed Amin Ul Haque inaugurated the second digital school of Sindh in Hyderabad. Digital education is based on advanced methods backed by technology. In the modern era, full of technology, digital education is a key to success. Pakistan education sector is moving towards the digitalization drive. Initiatives are being taken to develop modern digital schools in different cities of Pakistan.

In a recent inauguration ceremony of a digital school in Hyderabad, Federal IT Minister Syed Amin Ul Haque said that the digital school is the first of its kind in Hyderabad after Orangi Town's school in Karachi and its network would be extended to other districts of Sindh.

The digital school for girls up to primary and secondary was established in Orangi Town previously with the support of the Sindh Education Foundation, while in Hyderabad the digital school is being launched at the primary level where girls and boys will receive education together.

The digital schools provide many facilities like interactive whiteboards, touch screens, computers, projectors, access to online learning materials, E-books, video demonstration based learning and internet availability. The smart classrooms equipped with these gadgets help in an increased level of understanding on part of students.



Image credit: <https://www.phoneworld.com.pk/role-of-technology-in-transforming-digital-education-for-pakistani-students/>

Source: <https://propakistani.pk/2023/02/07/it-minister-inaugurates-2nd-digital-school-of-sindh-in-hyderabad/>

PEC Officially Opens Smart Classroom at UET Peshawar

The Chairman PEC, Engr. Muhammad Najeeb Haroon visited UET Peshawar. He visited the National Center for Artificial Intelligence (NCAI) where Dr. Gul Muhammad, Project Director NCAI manifested the projects of NCAI including early warning system for floods and earthquakes, safe city project and smart metering.

Chairman PEC inaugurated the Smart Classroom at Department of Industrial Engineering, UET Peshawar during his visit.

MoU was also signed between the Center for Intelligent Systems Network and Research (CISNR), NCAI UET Peshawar and PEC. Through this MoU, CISNR and NCAI will offer six month trainings, hands on experience and skills to the fresh engineers. PEC will pay Rs. 30,000 to each internee under its ‘On Job Training Program’.

Chairman PEC, Engr. M. Najeeb Haroon while addressing the audience said that Pakistan is hit by economic Covid as well as Pandemic Covid, now, this opportunity be grabbed to develop “made in Pakistan” brand products to overcome this economic crisis.



Image credit: <https://kics.edu.pk/web/uet-lahore-and-weidong-china-launched-smart-classroom-at-uet-lahore/>

Source: <https://pakobserver.net/chairman-pec-visits-uet/>

Disaster Management Information System Launched in KPK

The “Disaster Management Information System” (DMIS) has been launched in Khyber Pakhtunkhwa province to ensure disaster management authorities have quick access to accurate, actionable information and better handling of disasters with modern management skills to significantly reduce losses to human lives and infrastructures.

This system was launched as a result of extensive collaboration and working between the International Rescue Committee (IRC) and the Provincial Disaster Management Authority (PDMA) KP.

Director General PDMA-KP, explained that the DMIS system is developed as per geographic contextual needs and that it entails comprehensive modules on incident reporting, relief management, monitoring of water levels in rivers, integration of weather updates with the MET office, and camp management information.

The DMIS’s key innovation is the GIS component, which will allow PDMA to plot all incidents on a map and generate a daily situation report. This information will support relief organizations in the planning and implementation of humanitarian responses.” Furthermore, the system can record public grievances, which are routed to the appropriate district administration for resolution.



Image credit: <https://gnnhd.tv/news/15600/kp-disaster-management-authority-issues-flood-advisory-for-swat-river>

Source: <https://dailytimes.com.pk/1056537/irc-pdma-launch-disaster-management-information-system-in-kp/>

Project launched for Evaluation of Placer Gold Deposits in Attock, Punjab

The Punjab Mines and Minerals Department, in collaboration with the Geological Survey of Pakistan, on Tuesday launched a project for possible evaluation of placer gold deposits in the Indus River in District Attock. Additional Secretary, Mines and Minerals department Punjab Captain (Retd) Waqas Rasheed along with officials of the Geological Survey of Pakistan and Punjab Mines and Minerals department visited the site of the project in River Indus at Attock Khurd.

Assessment project was being implemented with the help of drone technology, geological survey, induced polarization and sampling. Through further drilling, sampling of underground material would be done in the promising area as a result of the survey.

Punjab is rich in natural resources and there is an urgent need for search and exploration. However, development and prosperity depend on the proper use of the resources with wisdom and intelligence. Such projects can lead to the massive discoveries of the economic minerals.

The evaluation project would be completed at a cost of Rs 48.2 million, a detailed report of which would be completed by June 2023.



Image credit and source: <https://www.pakistantoday.com.pk/2023/01/24/project-launched-for-evaluation-of-placer-gold-deposits-in-indus-river/>

Forest Department to Convert Fog into Water in Punjab

The Punjab Forest Department is going to start work on a project to convert fog into water in hilly, desert and other potential areas, in an effort to promote horticulture and get drinking water in water-scarce areas.

The method of obtaining water from fog is called ‘fog collector’. For the last 30 years, many countries had been working on it, and this experiment has been successful in various countries including Malaysia, Chile, South America, Peru, Ghana, South Africa, California, Morocco and Middle East. They are not only watering the plants but also getting drinking water from fog collectors. Many countries were getting huge benefits from this method; but this would be the first of its kind in Pakistan, to be started as a pilot project and around 100 saplings would be planted under this project.

This method is very successful in areas where the amount of water in fog is high, particularly in hilly areas. The vapors in the air take the form of liquid water droplets and this phenomenon is most observable on thin, flat, exposed objects, including plant leaves and grass blades. Keeping this in mind, a mesh sheet (green net for plants) is installed in a vertical pattern so that the air can pass through it, converting vapors into drops, which are channeled into a filtration system, thus gathering clean water.

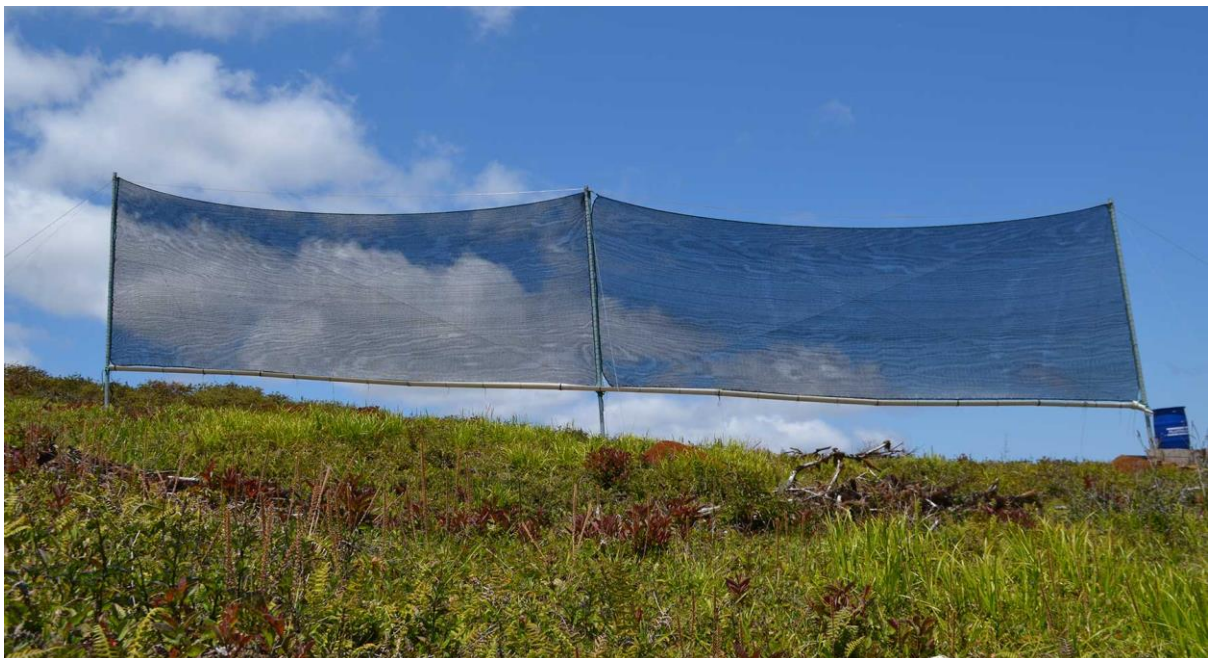


Image credit: <https://www.darwinfoundation.org/en/blog-articles/743-update-report-year-one-harvesting-water-isabela-galapagos>

Source: <https://dailytimes.com.pk/1054592/forest-dept-working-on-converting-fog-into-water/>

Pakistan Railways Set to Launch RABTA App

Pakistan Railways signed an agreement with two Chinese companies for the launch of Railway Automated Booking and Travel Assistance (RABTA) app. According to the Minister for Railways Khawaja Saad Rafique, the initiative is started at a mutual benefit situation for Pakistan Railway.

The application will enable passengers to manage their journey right from their homes. Through this app, the passengers would be able to buy tickets, select seats, and manage food, taxi and hotel booking related matters.

According to the Minister of Railways, the app is not only planned to facilitate passengers, but also to create record income for the Railways department. Through RABTA app, the parcel booking and tracking facility will also be available for passengers.

The application is planned to enable the users to access the train operation management system. The application development is a mutual benefit sharing project with the two Chinese companies, M/S Easyway Company and M/s Norinco.



Image credit: <https://www.globalvillagespace.com/reforming-pakistan-railways/>

Source: <https://tribune.com.pk/story/2399834/railways-set-to-launch-rabta-app-with-chinese-help>

Ministry of Industry Proposes Subsidized E-Bike Scheme

In a step towards reduction of costly fuel usage and protection of environment, the ministry of Industries and Production has devised an Electric Bike Scheme under which the ministry has proposed subsidized and bank financing plans for promotion of usage of the Two Wheelers (E-Bikes) in the country.

The ministry has planned to initially produce at least 100,000 E-Bikes in 18 months. For running the new bikes on roads, the ministry has proposed a subsidy plan of Rs 17.5 billion in three years to encourage the purchase of comparatively costlier bikes.

As per the plan the government would bear down payment of Rs 90000 of an E-Bike with estimated cost of Rs 170000 whereas the purchaser will pay Rs 10000 as share of down payment making the total down payment to Rs 100000. The bank, which will provide a commercial loan of Rs 70000, will charge interest of Kibor+2 or 19 percent which is estimated to be Rs 13300.

Through the proposed scheme, a 24 monthly installment plan has also been given under which the customer will be paying Rs 4310 per month which includes the principal amount of Rs 2917, interest payment of Rs 1109 and insurance payment (2pc) of Rs 284.



Image credit and source: <https://profit.pakistantoday.com.pk/2022/12/30/ministry-of-industry-proposes-subsidised-e-bike-scheme/>

EDB Organizes Summit to Increase Export of Mobile Phones

Ministry of Industries and Production held mobile device manufacturing summit. Engineering Development Board (EDB), the attached department of the ministry of industries and production jointly organized mobile device manufacturing summit in collaboration with Pakistan mobile phone manufacturers association. The summit accompanied with an exhibition of technology and products by the members of association including Xiaomi, Realmi, Infinix, Tecno, Itel, Alcatel, G-Five, Oppo, Vivo, Premier Code etc.

The event was attended by mobile device manufacturers, government officials from the Ministry of Industries and Production, the Pakistan Telecommunication Authority, the Ministry of Commerce, the National Tariff Commission, the Board of Investment, the Ministry of IT and Telecom, the Federal Board of Revenue, and academia.

The Mobile Device Manufacturing Policy, developed by EDB in 2020, aims to promote local manufacturing of mobile devices in Pakistan and to provide an appealing environment for investors to supplement the government of Pakistan's "Made in Pakistan" strategy. As a result of the policy, 31 companies have been established, producing nearly all of the country's well-known international mobile phone brands.



Image credit: <https://tribune.com.pk/story/2398612/pmpma-and-edb-team-up-to-boost-the-smartphone-industry-in-pakistan-1>

Source: http://pid.gov.pk/site/press_detail/21903

NTSOC Launched to Improve Cybersecurity in Pakistan

Pakistan Telecommunication Authority (PTA) has launched its National Telecom Security Operations Center (NTSOC), a centralized platform for the management of cybersecurity incidents in the telecom sector. The NTSOC is established under the Pakistan National Cybersecurity Policy 2021 and Prevention of Electronic Crimes Act (PECA 2016), with the goal of securing Pakistan's critical telecom data and infrastructure against cyber-attacks.

The NTSOC is the first ever sectoral Security Operations Center in Pakistan, after issuance of Cyber Security Policy. It is comprised of three key components, Security Incident and Event Management (SIEM), Threat Intelligence, and Security Orchestration and Automated Response (SOAR) which have been indigenously customized to improve the country's cybersecurity ranking.

The NTSOC will have integration with telecom operators' SOC's and the national Computer Emergency Response Team (CERT), ensuring quick and effective incident response. Six telecom operators have been integrated with the NTSOC, with the rest to follow gradually. The project includes continuous enhancements in the provided solution to keep pace with evolving cybersecurity threats.



Image credit and source: <https://www.pta.gov.pk/en/media-center/single-media/pta-launches-ntsoc-to-strengthen-cybersecurity-in-pakistan-140223>

NUMS and PARC Ink DoU to Strengthen Academic and Scientific Collaboration

National University of Medical Sciences (NUMS) and Pakistan Agricultural Research Council (PARC) signed a 5-year Document of Understanding (DoU) to strengthen their scientific, technical and academic collaboration which would help advance promotion of science and technology in the country. The DoU was inked by NUMS acting Vice Chancellor and Pro VC (Acad), Maj Gen Saleem Ahmed Khan, HI (M), Retd. and Chairman PARC Dr. Ghulam Muhammad Ali at a ceremony held at PARC head office Islamabad. NUMS Registrar Brig. Muhammad Azhar Shams, TI (M), (Retd) and Dean Faculty Multidisciplinary Studies Prof. Dr. Aisha Mohyuddin were present on the occasion.

Maj. Gen. Saleem Ahmed Khan (Retd) on the occasion, briefed PARC delegation on NUMS's contribution in healthcare and research while highlighting the areas of collaborative research including phytochemistry, herbarium development, vaccine development and nutraceuticals. He also emphasized the importance of cooperation between NUMS & PARC to capitalize on each other's strengths and expertise.

Under the DOU, both institutes agreed to exchange of expertise, scientific information, research material, students and facilitate internships for research & academic development. They agreed to define areas of collaboration of mutual interest to access knowledge, data, libraries, classrooms, labs, fields, and other facilities at the institutions & country-wide establishments of the two parties.



Image credit and source: <https://numspak.edu.pk/featuredevent-detail/nums-and-parc-inks-document-of-understanding-to-strengthen-academic-and-scientific-collaboration>

Special Drones That can Land in Trees to Collect Environmental DNA

Researchers in Zurich have developed a special drone that can land in trees. The drone's underside collects environmental DNA for the determination of biodiversity. It is now being trained for a challenging competition in the rainforests of Singapore.

Scientists have developed a special drone that can autonomously collect samples from tree branches. According to a press release, researchers at the Swiss Federal Institute of Technology Zurich (ETH) and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) in Birmensdorf in the canton of Zurich were involved.

The samples collected contain environmental DNA. From this, laboratory tests can then determine the species in a particular area. This helps ecologists to gain more knowledge about the biodiversity of regions that would otherwise be difficult to access.

According to the information provided, a special challenge for the robotics specialists with regard to this was to program the drone so that it could land on branches with different flexibilities and remain there for a certain amount of time.

Drone will be prepared and improved further for a competition in a rainforest region spanning 100 hectares in Singapore. It will need to be able to fly to and collect samples from ten times as many trees as it currently can in three days, but for the competition only one day will be allowed.



Image credit and source: <https://www.s-ge.com/en/article/news/20231-robotics-drones-can-land-trees#:~:text=Researchers%20in>

Ultra-Lightweight Sensor Systems in Drones to Monitor Volcanoes

Composition of gases emitted by volcanoes can provide information on the possibility of imminent eruptions. Lightweight drones make investigation possible even in areas that are difficult to access. The main gases released by volcanoes are water vapor, carbon dioxide, and sulfur dioxide.

Analyzing these gases is one of the best ways of obtaining information on volcanic systems and the magmatic processes that are underway. The ratio of carbon dioxide levels to those of sulfur dioxide can even reveal the likelihood of an impending eruption. Drones are employed to carry the necessary analytical systems to the site of activity.

A team headed by Professor Thorsten Hoffmann at Johannes Gutenberg University Mainz (JGU) has recently been assessing the potential for using a small, portable observation drone in remote regions.

This very compact drone system can even be conveyed on foot to sites that are extremely difficult to access. In addition, it requires only minimal flight and administrative preparations for operation as an aerial observation platform.

In collaboration with volcanologist Dr. Nicole Bobrowski of Heidelberg University and the National Institute of Geophysics and Volcanology (INGV) in Catania, the Mainz-based research team has been trialing a tiny commercial drone weighing less than 900 grams equipped with miniaturized, lightweight sensors. This combination that weighs no more than a bottle of mineral water could be transported easily to the scene in a backpack. In particular, the risk to volcanologists of being endangered by sudden changes in volcanic activity is significantly reduced by the greater distances involved. Moreover, drones make it possible to reach emission sources that are otherwise difficult or even impossible to access, such as fumaroles in steep, slippery terrain or older parts of the plume that are typically located in downwind areas and at higher altitudes.



Image credit and source: <https://press.uni-mainz.de/using-drones-to-monitor-volcanoes-researchers-analyze-volcanic-gases-with-the-help-of-ultra-lightweight-sensor-systems/>

Vehicle Crash Prevention Technology learnt from Insects

Despite only about 25% of car travel happening after dark, almost half of fatal accidents occur at night. Current systems to avoid accidents are often complicated, resource-intensive or work poorly in the dark. But now, researchers have designed a simple, power-saving collision detector inspired by the way insects avoid bumping into one another.

Numerous collision avoidance systems (CASs) are already included in vehicles, and they can automatically brake when an object gets too close. Some operate by analyzing an image of the space around the car, but in conditions like heavy rain or low light, the image isn't as clear. To make up for it, complicated signal processors are used to make sense of what is still visible. Another method is to incorporate either radar or LiDAR (light detection and ranging) sensors, but these are difficult to miniaturize and need a lot of power. But these instruments can add unnecessary weight, energy requirements and complications, despite making the vehicle safe.

But insects, including locusts and flies, can easily avoid collisions with each other without relying on fancy software or LiDAR, even at night. Instead, they engage certain obstacle-avoiding neural circuits, which are highly efficient and could inspire a next-generation CAS.

First, the team designed an algorithm based on the neural circuitry insects use to avoid an obstacle. Instead of processing an entire image, they only processed one variable: the intensity of a car's headlights. Without the need for an onboard camera or image sensor, the detection and processing units were combined, making the overall detector smaller and more energy efficient. The sensor was comprised of eight photosensitive "memtransistors" constructed from a layer of molybdenum disulfide (MoS₂), organized onto a circuit. It took up only 40 μm^2 and used only a few hundred picojoules of energy.



Image credit and source: <https://www.acs.org/pressroom/presspacs/2023/january/preventing-vehicle-crashes-by-learning-from-insects.html#:~:text=>

A Molecule Sized Electric Motor

Electric vehicles, powered by macroscopic electric motors, are increasingly prevalent on our streets and highways. These quiet and eco-friendly machines got their start nearly 200 years ago when physicists took the first tiny step to bring electric motors into the world. Now a multidisciplinary team led by Northwestern University has made an electric motor that can't be seen with the naked eye, an electric motor on the molecular scale. This early work on molecular sized motor has implications for material science and particularly medicine, where the electric molecular motor could team up with biomolecular motors in the human body.

According to Fraser Stoddart, this elegant chemistry uses electrons to effectively drive a molecular motor, much like a macroscopic motor. While this area of chemistry is in its infancy, one day these tiny motors will make a huge difference in medicine. Only 2 nanometers wide, the molecular motor is the first to be produced. The motor is easy to make, operates quickly and does not produce any waste products. The research team focused on a certain type of molecule with interlocking rings known as catenanes held together by powerful mechanical bonds, so the components could move freely relative to each other without falling apart. The electric molecular motor specifically is based on a catenane whose components, a loop interlocked with two identical rings are redox active, i.e. they undergo unidirectional motion in response to changes in voltage potential.

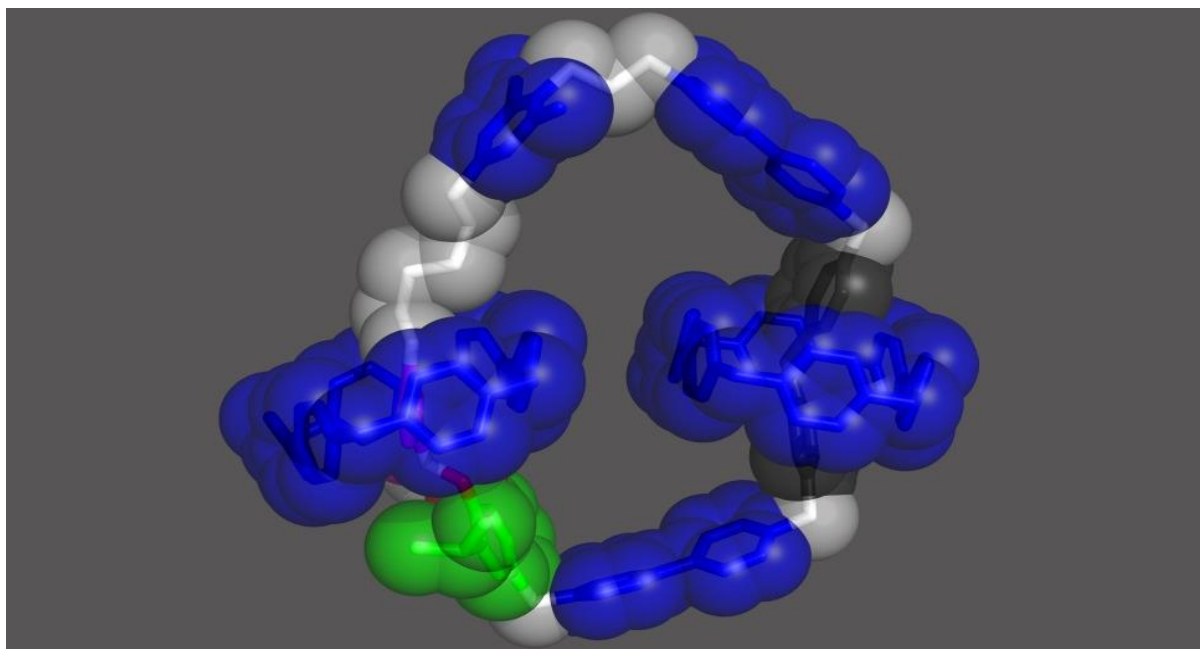


Image credit and source: <https://news.northwestern.edu/stories/2023/01/now-on-the-molecular-scale-electric-motors/>

Materials Capable of Purifying Water by Photo-thermal Effect

A team of researchers at Daegu Gyeongbuk Institute of Science and Technology (DGIST) developed an atypical porous polymer material that can completely remove phenolic organic contaminants in water at ultra high speeds.

The porous material can efficiently remove not only microplastics in the water but also very small-sized VOCs (Volatile Organic Compounds) based on photothermal effect. At the same time, it is expected to be utilized as a high-efficiency adsorption material that can be commercialized in the future as it has cost competitiveness based on raw materials and enables solar-based water purification process.

Various water purification technologies and materials have been developed to solve the water contamination problem. Carbon-based porous materials using existing adsorption mechanisms have limitations in that the adsorption rate is slow and high thermal energy is required for recycling.

The researchers succeeded in synthesizing a porous polymer with excellent adsorption performance and photothermal properties by reacting an inexpensive and effective precursor. Also, an additional oxidation reaction was experimented on the polymer, and based on the results, a hydrophilic functional group was introduced to enable fast adsorption of micro-pollutants in the aquatic environment. It was confirmed through experiments that the polymer developed by the research team does not require high thermal energy for recycling and can be used multiple times without loss of performance.

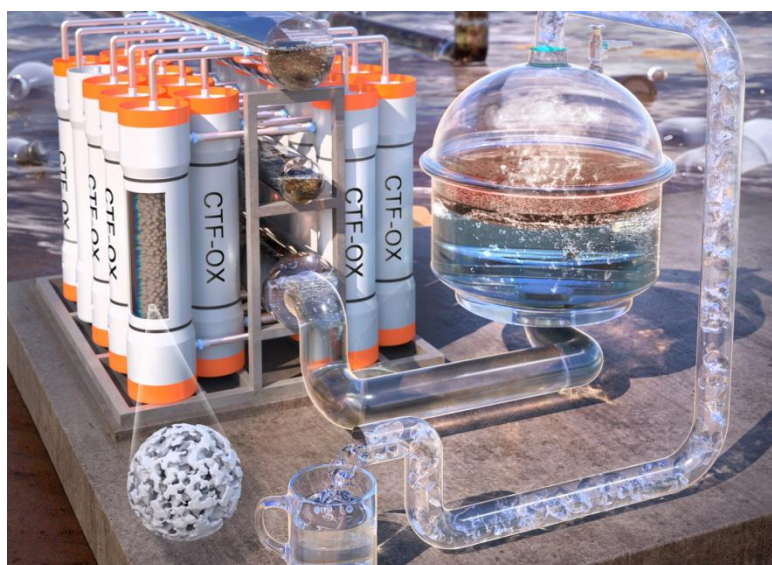


Image credit and source:

<https://www.dgist.ac.kr/en/html/sub06/060202.html?mode=V&no=7277f6470fc8256a14631635a59f9e17>

Creating 3D Objects with Sound

Scientists from the Max Planck Institute for Medical Research and the Heidelberg University have created a new technology to assemble matter in 3D. Their concept uses multiple acoustic holograms to generate pressure fields with which solid particles, gel beads and even biological cells can be printed. These results pave the way for novel 3D cell culture techniques with applications in biomedical engineering. Additive manufacturing or 3D printing enables the fabrication of complex parts from functional or biological materials. Conventional 3D printing can be a slow process, where objects are constructed one line or one layer at a time.

Researchers in Heidelberg and Tübingen now demonstrate how to form a 3D object from smaller building blocks in just a single step. They were able to assemble microparticles into a 3D object within a single shot using shaped ultrasound. This can be very useful for bioprinting. The cells used there are particularly sensitive to the environment during the process.

The scientists believe that this technology is a promising platform for the formation of cell cultures and tissues in 3D. The advantage of ultrasound is that it is gentle for using biological cells and that it can travel deep into tissue. This way it can be used to remotely manipulate and push cells without harm.

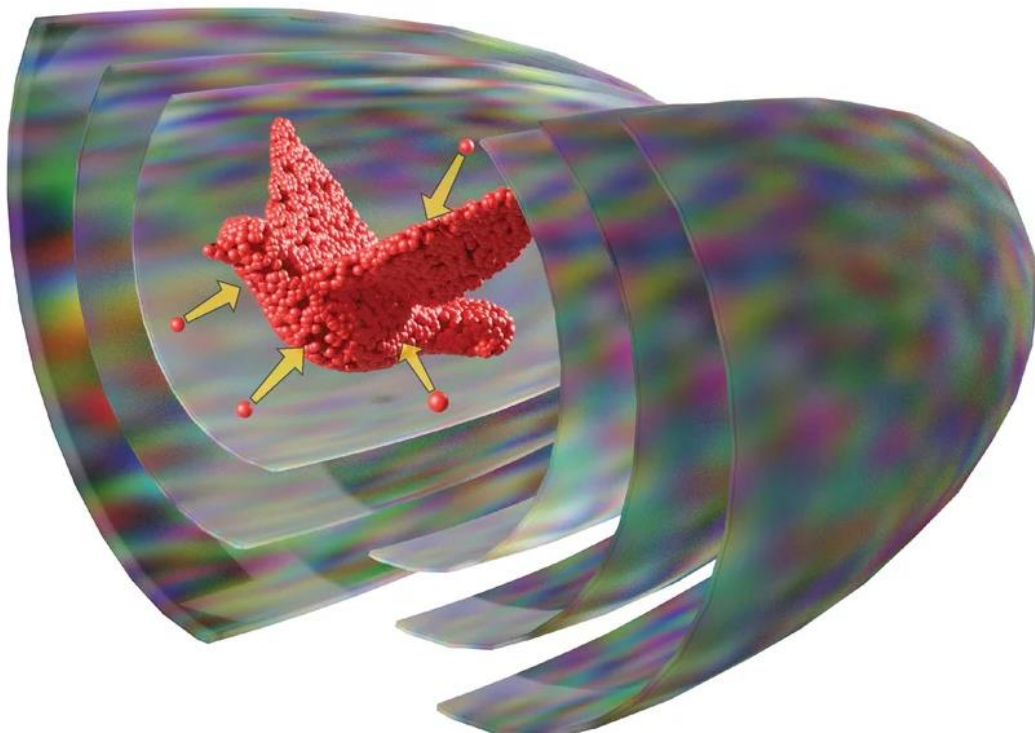


Image credit and source: <https://www.mpg.de/19859671/0209-mefo-creating-3d-objects-with-sound-153070-x>

Researchers Develop Elastic Material that is Impervious to Gases and Liquids

An international team of researchers has developed a technique that uses liquid metal to create an elastic material that is impervious to both gases and liquids. Applications for the material include use as packaging for high-value technologies that require protection from gases, such as flexible batteries.

Basically, things that were good at keeping gases out tended to be hard and stiff. And things that offered elasticity allowed gases to seep through. Scientists have come up with something that offers the desired elasticity while keeping gases out. The new technique makes use of a eutectic alloy of gallium and indium (EGaIn).

Eutectic means that the alloy has a melting point that is lower than its constituent parts. In this case, the EGaIn is liquid at room temperature. The researchers created a thin film of EGaIn, and encased it in an elastic polymer.

The interior surface of the polymer was studded with microscale glass beads, which prevented the liquid film of EGaIn from pooling. The end result is essentially an elastic bag or sheath lined with liquid metal, which does not allow gases or liquids in or out.

The researchers tested the effectiveness of the new material by assessing the extent to which it allowed liquid contents to evaporate, as well as the extent to which it allowed oxygen to leak out of a sealed container made of the material and found that there was no measurable loss of either liquid or oxygen for the new material.

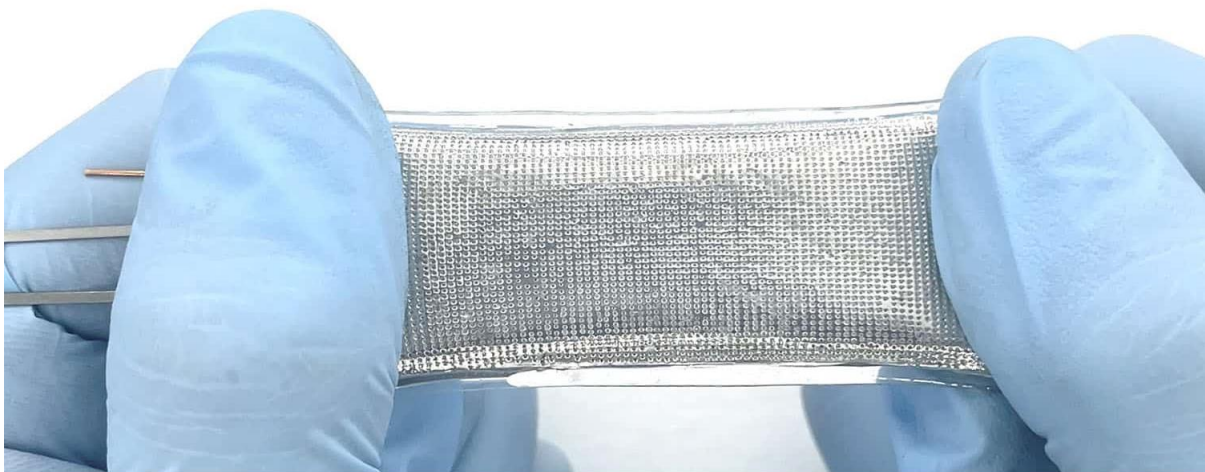


Image credit and source: <https://news.ncsu.edu/2023/02/elastic-material-impervious/>

An Optical Tractor Beam That Pulls Macroscopic Objects

Expanding laser pulling beyond the microscopic scale could be useful for scientific and space applications. Researchers have developed a way to use laser light to pull a macroscopic object. Although microscopic optical tractor beams have been demonstrated before, this is one of the first times that laser pulling has been used on larger objects.

Light contains both energy and momentum that can be used for various types of optical manipulation such as levitation and rotation. Optical tweezers, for example, are commonly used scientific instruments that use laser light to hold and manipulate tiny objects such as atoms or cells. For the last ten years, scientists have been working on a new type of optical manipulation, using laser light to create an optical tractor beam that could pull objects.

In previous studies, the light pulling force was too small to pull macroscopic objects. In the new work, the researchers designed a special graphene-SiO₂ composite structure specifically for laser pulling. When irradiated with a laser, the structure creates a reversed temperature difference, meaning that the side facing away from the laser gets hotter.

When objects made from the graphene-SiO₂ composite structure are irradiated by a laser beam, gas molecules on their back side receive more energy and push the object toward the light source. Combining this, with the low air pressure of a rarified gas environment, allowed the researchers to obtain a laser pulling force that was strong enough to move macroscopic objects.



Image credit and source: https://www.optica.org/en-us/about/newsroom/news_releases/2023/january/researchers_create_an_optical_tractor_beam_that_pu/#:~:text=WASHINGTON

Scientists Developed a New Method of Refrigeration

Researchers at the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) have applied basic concept of adding salt to ice for melting, to develop a new method of heating and cooling called "Ionocaloric cooling".

Ionocaloric cooling takes advantage of how energy, or heat, is stored or released when a material changes phase, such as changing from solid ice to liquid water. Melting a material absorbs heat from the surroundings, while solidifying it releases heat. The ionocaloric cycle causes this phase and temperature change through the flow of ions (electrically charged atoms or molecules) which come from a salt.

Researchers hope that the method could one day provide efficient heating and cooling, which accounts for more than half of the energy used in homes, and help phase out current "vapor compression" systems, which use gases with high global warming potential as refrigerants. Ionocaloric refrigeration would eliminate the risk of such gases escaping into the atmosphere by replacing them with solid and liquid components.

The new ionocaloric cycle joins several other kinds of "caloric" cooling in development. The techniques use different methods, including magnetism, pressure, stretching and electric fields to manipulate solid materials so that they absorb or release heat.

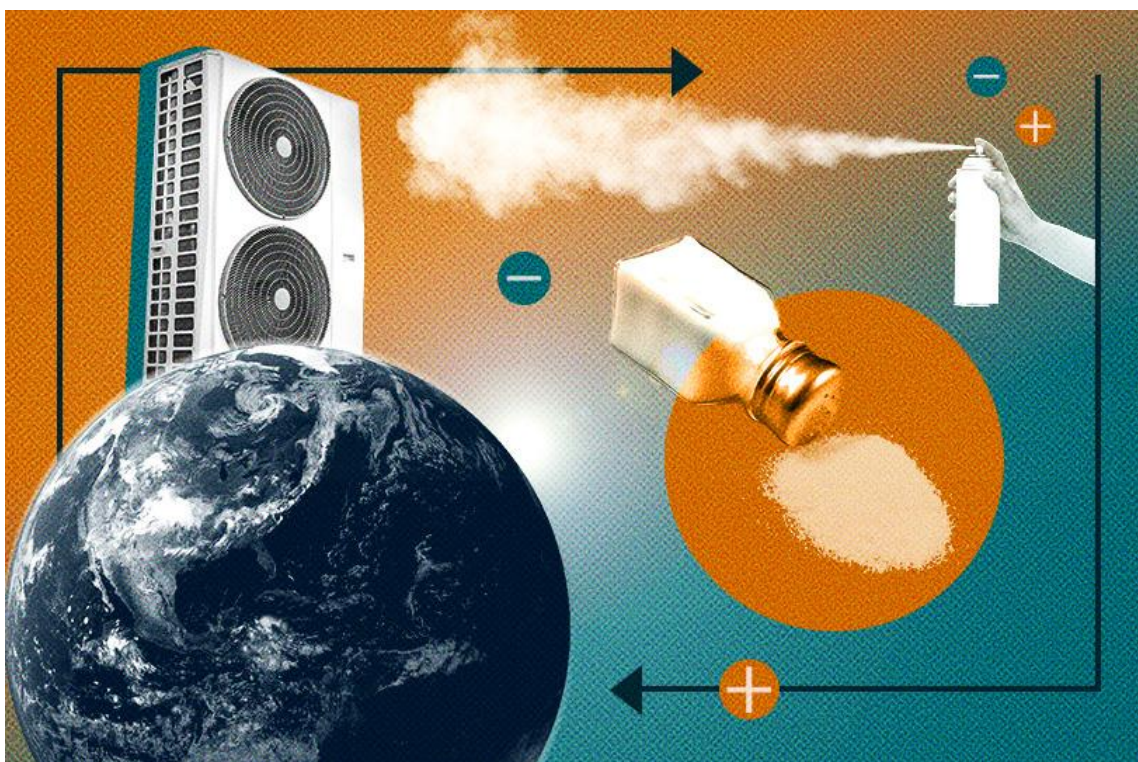


Image credit and source: <https://newscenter.lbl.gov/2023/01/03/cool-new-method-of-refrigeration/#:~:text=Researchers>

Engineered Wood Grows Stronger While Trapping Carbon Dioxide

A new method by scientists from Rice University could lower both emissions and building construction costs. Rice University scientists have designed a new method to engineer wood for trapping carbon dioxide through a potentially scalable, energy-efficient process making the material stronger for use in construction. Structural materials like steel or cement come at a high cost and increased carbon dioxide emissions. Working to address both issues at once, materials scientist Muhammad Rahman and collaborators found a way to incorporate molecules of a carbon dioxide-trapping crystalline porous material into wood.

According to the lead author and researcher, Muhammad Rahman, engineered wood did exhibit greater strength than normal, untreated wood. Wood is made up of three essential components, cellulose, hemicellulose and lignin. Lignin is what gives wood its color, so when you take lignin out, the wood becomes colorless. Removing the lignin is a fairly simple process that involves a two-step chemical treatment using environmentally benign substances. After removing the lignin, we use bleach or hydrogen peroxide to remove the hemicellulose.

Next, the delignified wood is soaked in a solution containing microparticles of a metal-organic framework, or MOF, known as Calgary framework 20 (CALF-20). MOFs are high-surface-area sorbent materials used for their ability to adsorb carbon dioxide molecules into their pores. The MOF particles easily fit into the cellulose channels and get attached to them through favorable surface interactions.



Image credit and source: <https://news.rice.edu/news/2023/engineered-wood-grows-stronger-while-trapping-carbon-dioxide#>

A Road Capable of Melting Snow and Ice on Its Own

Slipping and sliding on snowy or icy roads is dangerous. Salt and sand help melt ice or provide traction, but excessive use is bad for the environment. And sometimes, a surprise storm can blow through before these materials can be applied. Now, researchers reporting in ACS Omega have filled microcapsules with a chloride-free salt mixture that's added into asphalt before roads are paved, providing long-term snow melting capabilities in a real-world test.

Researchers have incorporated salt-storage systems into “anti-icing asphalt” to remove snow and prevent black ice from forming. However, these asphalt pavements use corrosive chloride-based salts and only release snow-melting substances for a few years. The researchers prepared a sodium acetate salt and combined it with a surfactant, silicon dioxide, sodium bicarbonate and blast furnace slag which is a waste product from power plant operations to produce a fine powder. They then coated the particles in the powder with a polymer solution, forming tiny microcapsules. Next, the team replaced some of the mineral filler in an asphalt mixture with the microcapsules.

In initial experiments, a pavement block made with the new additive lowered the freezing point of water to -6 F. And the researchers estimated that a 5-cm-thick layer of the anti-icing asphalt would be effective at melting snow for seven to eight years. A real-world pilot test of the anti-icing asphalt on the off-ramp of a highway showed that it melted snow that fell on the road, whereas traditional pavement required additional removal operations.



Image credit and source: <https://www.acs.org/pressroom/presspacs/2023/february/keeping-drivers-safe-with-a-road-that-can-melt-snow-ice-on-its-own.html>

A Switch Made from a Single Molecule

A special carbon molecule can function as multiple high-speed switches at once. For the first time, an international team of researchers, including those from the University of Tokyo's Institute for Solid State Physics, has demonstrated a switch, analogous to a transistor, made from a single molecule called fullerene.

By using a carefully tuned laser pulse, the researchers are able to use fullerene to switch the path of an incoming electron in a predictable way. This switching process can be three to six orders of magnitude faster than switches in microchips, depending on the laser pulses used. Fullerene switches in a network could produce a computer beyond what is possible with electronic transistors, and they could also lead to unprecedented levels of resolution in microscopic imaging devices.

The fullerene molecule underlying the switch is related to the perhaps slightly more famous carbon nanotube, though instead of a tube, fullerene is a sphere of carbon atoms. When placed on a metal point, essentially the end of a pin, the fullerenes orientate a certain way so they will direct electrons predictably.

In principle, as multiple ultrafast electron switches can be combined into a single molecule, it would only take a small network of fullerene switches to perform computational tasks potentially much faster than conventional microchips.

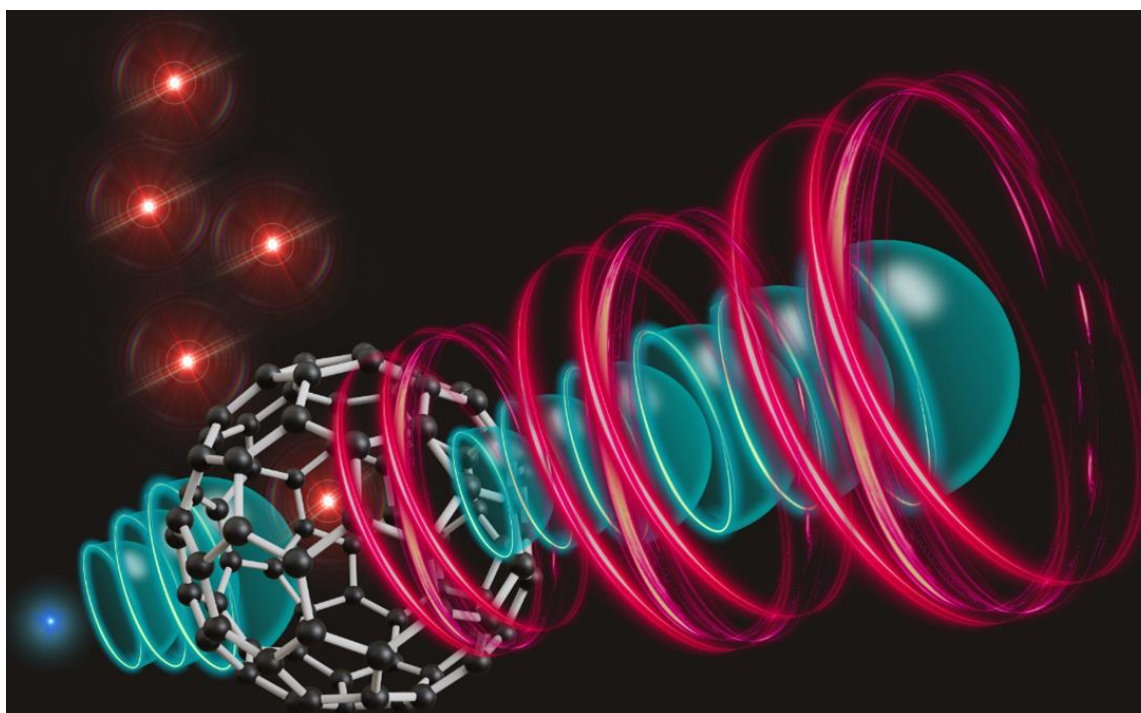


Image credit and source: [https://www.u-tokyo.ac.jp/focus/en/press/z0508_00282.html#:~:text=Fullerene%](https://www.u-tokyo.ac.jp/focus/en/press/z0508_00282.html#:~:text=Fullerene%20) .

FORTHCOMING TECH EVENTS

PAKISTAN

- International Conference on Integrated Flood Management under Changing Climate Scenario
March 1 – 3, 2023, Mehran University of Engineering & Technology, Jamshoro
<https://ifmcc.water.muet.edu.pk/>
- 2nd International Industrial Chemistry Conference
March 3 – 4, 2023, NED University of Engineering & Technology, Karachi
<https://iicc.neduet.edu.pk/>
- 5th International Conference on Robotics and Automation in Industry
March 3 – 5, 2023, University of Engineering and Technology, Peshawar
<https://icrai2023.org/>
- International Conference on Renewable Energy and Advanced Materials (ICREAM 2023)
March 6 – 8, 2023, NCE in Physical Chemistry, University of Peshawar, Peshawar
<http://www.uop.edu.pk/events/?q=722>
- 2nd International Conference on Zoological Emerging Scientific Trends (ZEST-2023)
March 7 – 8, 2023, University of Education, Lahore
<https://ue.edu.pk/zest2023/>
- 2nd International Conference on Energy, Power, Environment, Control, and Computing (ICEPECC-2023)
March 8 – 9, 2023, University of Gujrat, Gujrat
<https://uog.edu.pk/en/ICEPE2023/>
- Pre Conference Workshop on Understanding Challenges to Livestock of Pakistan
March 10th, 2023, College of Veterinary and Animal Sciences, Jhang
<http://ichs2023.uvas.edu.pk/pre-conference-workshop/>
- 3rd International Conference Sustainable Utilization of Natural Resources (SUN-R)
March 13 – 14, 2023, Rak Tahirkheli Auditorium, NCEG, University of Peshawar, Peshawar
<http://www.uop.edu.pk/events/?q=721>
- Conference: Mathematics for EVERYONE
March 13 – 14, 2023, The Aga Khan University, Karachi
<https://www.aku.edu/events/pages/event-detail.aspx?EventID=2245>
- International Conference on Health Security - ICHS
March 14 – 15, 2023, University of Veterinary and Animal Sciences, Lahore
<http://ichs2023.uvas.edu.pk/>
- 2nd International Conference on Emerging Trends in Electronic and Telecommunication Engineering, 2023 (INTERACT-2023)
March 15 – 16, 2023, NED University of Engineering & Technology, Karachi
<https://interact.neduet.edu.pk/>
- International Conference on Climate Change: Challenges and Responses
March 15 – 17, 2023, University of Central Punjab, Lahore
<https://fhssconferences.ucp.edu.pk/#>
- 1st International Conference on Soil Pollution and Remediation
March 15 – 16, 2023, Forman Christian College, Lahore
<https://www.fccollege.edu.pk/icspr-2023/>
- 6th International Conference on Energy Conservation and Efficiency (ICECE) 2023
March 15 – 16, 2023, University of Engineering and Technology, Lahore
<https://icece.kics.edu.pk/2023/>
- International Workshop on Laboratory Safety & Security Management in academic laboratories
March 15 – 16, 2023, University of Sargodha, Sargodha
<https://su.edu.pk/news/International-Workshop>

- 1st International conference on Civil and Environmental Engineering Technology (ICCET)
March 16th, 2023, Mir Chakar Khan Rind University of Technology, Dera Ghazi Khan
<https://www.mcut.edu.pk/introduction-iccet/>
- International Symposium 2023 on Bridging the Gap Between Foundational Education & Health Sciences
March 17 – 18, 2023, Dow University of Health Sciences, Karachi
<https://www.duhs.edu.pk/events/international-symposium-2023-on-bridging-the-gap-between-foundational-education-health-sciences>
- 1st International Conference on New Trends in Civil Engineering
March 20 – 21, 2023, University of Central Punjab, Lahore
<https://ucp.edu.pk/announcement/1st-international-conference-on-new-trends-in-civil-engineering/>
- 1st International Multidisciplinary Conference on Emerging Trends in Engineering Technology
May 9, 2023, Benazir Bhutto Shaheed University of Technology & Skill Development, Khairpur Mirs, Khairpur
<http://imceet.bbsutsd.edu.pk/>

INTERNATIONAL

- International Conference on Civil, Structural and Environmental Engineering
March 6 – 8, 2023, Rome, Italy
<https://www.pagesconferences.com/2023/civil-environmental-engineering>
- History of UK Particle Accelerators
March 7th, 2023, Warrington , Oxfordshire, UK
<https://iop.eventsair.com/h-uk-pa-2023>
- 2nd International Conference on Applied Physics and Engineering
March 15 – 17, 2023, Paris, France
<https://appliedphysics.pulsusconference.com/>
- 8th International Conference on Environmental Pollution, Treatment and Protection (ICEPTP 2023)
March 29 – 31, 2023, Lisbon, Portugal
<https://iceptp.com/>
- 8th International Conference on Geotechnical Research and Engineering (ICGRE 2023)
March 29 – 31, 2023, Lisbon, Portugal
<https://icgre.org/>
- 8th International Conference on Structural Engineering and Concrete Technology (ICSECT 2023)
March 29 – 31, 2023, Lisbon, Portugal
<https://icsect.com/>
- 3rd International Conference on Basic Sciences, Engineering and Technology (ICBASET)
April 27 – 30, 2023, Marmaris, Turkey
<https://www.2023.icbaset.net/>
- 49th IOP Annual Plasma Physics Conference
March 27 – 30, 2023, Oxford, UK
<https://iop.eventsair.com/ppc2023/>
- Space Tech Expo USA Conference
May 2 – 4, 2023, Long Beach, California, USA
<https://www.spacetechexpo.com/conference>

TECH AND TRADE OFFERS

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Our Products/Services



Renewable Energy



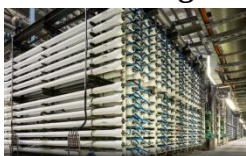
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Electrical Engineering



Fabrication



Treatment plants



Water resources



Designing



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