

TECHNOLOGY ROUNDUP

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- Pakistan Science Expo
- Build 2022 Construction Trade Fair
- International Conference on Science, Engineering & Technology - ICSET 2022.
- World Congress on Industrial Biotechnology (WCIB)
- International Conference on Engineering & Technology
- IMPACT 2022
- MicroStrategy World 2022
- Developer Week
- Digital Geospatial Intelligence (DGI)

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The Catalyst GIK Incubator inaugurated

The Catalyst GIK Incubator has been inaugurated by Mr. Atif Khan, Minister for Science and Technology & Information Technology, Department Khyber Pakhtunkhwa on December 14th, 2021.



To create an atmosphere for nurturing ideas into commercialized products, GIK University in partnership with the provincial Government of Khyber Pakhtunkhwa, has set up a state-of-the-art Incubator facility. The Incubator allows budding entrepreneurs access to the latest technology equipment, machinery and research know-how necessary to facilitate product design and commercialization. Top teams are selected from business plan competitions held regularly throughout the year.

The Catalyst GIK Incubator is a technology incubator and the only residential Incubator in Pakistan, where start-ups live on the campus free of cost and spend most of their time building the next big thing. Funded and supported by Directorate of Science and Technology, Government of Khyber Pakhtunkhwa.

Atif Khan said that the KP government would extend complete financial support to the GIK Institute and some of its projects would be included in the current financial year and the remaining in the 2022-23 annual development programme.

For further information visit: <https://giki.edu.pk/the-catalyst-gik-incubator/>

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Pakistani Startup EPTeck Won Silver Medal in Global Innovation Challenge Organized by FAO United Nations

According to the official source of Startup Pakistan, Pakistani Startup; EPTeck recently got 2nd Position and a silver medal globally in “Global AgriInno Challenge 2021” by the FAO (Food & Agriculture Organization) of United Nations



In Global AgriInno Challenge 2021, a total of 157 innovative ideas from 37 countries were submitted. However, in only four weeks, 9 experts from world-renowned organizations evaluated the innovative products and also shortlisted the top 10 best products.

The final round of the challenge was quite interesting that consists of 36 hours of online training with different speakers and trainers to get ready for the final pitches. Moreover, after the final round, the results were announced which makes Pakistan proud. EPTeck presented its innovative solution for Digital Agriculture named “RemoteWell” and got 2nd Position (Silver Medal) among 157 innovative products from 37 countries. The event was organized by the Food & Agriculture Organization of United Nations in cooperation with Zhejiang University, Ministry of Agriculture China, and International Telecommunication Union.

EPTeck Technologies is an embedded, automation, and software development company led by passionate Pakistani engineers based in Germany and Pakistan. The company is successfully providing a product sustainable solution for digital and precision agriculture.

EPTeck provides a solution that is easily adaptable to the existing ecosystem for farmers. It works through the farmer's mobile app. The company impacts the Socio-Economic sustainable change in our culture and society.

Smart control of Water Flow/ TubeWells and Smart Control of Drip Irrigation Deployed is handled through a RemoteWell. It is currently deployed in 7 districts of Pakistan Lahore, Faisalabad, Gujranwala, Pakpattan, Okara, Lodhran, and Bahawalpur. The company has got a great response from farmers groups and deploying the product all over the country in 2022. EPTeck is going for RemoteWell “Series B” production and after the local expansion in Pakistan, the company is ready to take this product to the international market starting from Turkey, Poland, and Morocco. Tech product exports will add huge value to the economy of Pakistan which must be encouraged at the highest level. EPTeck is a fast-growing startup with a current headcount of 30+ in many countries. However, its effective team is behind the success of the organization that is continuously striving to excel not only in domestic but international markets also.

For further information visit: <https://startuppakistan.com.pk>

Scientists demonstrate a novel rocket for deep-space exploration.

The growing interest in deep-space exploration has sparked the need for powerful long-lived rocket systems to drive spacecraft through the cosmos. Scientists at the U.S. Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL) have now developed a tiny modified version of a plasma-based propulsion system called a Hall thruster that both increases the lifetime of the rocket and produces high power.

The miniaturized system powered by plasma -- the state of matter composed of free-floating electrons and atomic nuclei, or ions -- measures little more than an inch in diameter and eliminates the walls around the plasma propellant to create innovative thruster configurations. Among these innovations are the cylindrical Hall thruster, first proposed and studied at PPPL, and a fully wall-less Hall thruster. Both configurations reduce channel erosion caused by plasma-wall interactions that limit the thruster lifetime -- a key problem for conventional annular, or ring-shaped, Hall thrusters and especially for miniaturized low-power thrusters for applications on small satellites.

The new high-thrust-density rocket can be especially beneficial for tiny cubic satellites, or CubeSats. Masaaki Yamada, Simmonds' co-doctoral adviser who heads the Magnetic Reconnection Experiment (MRX) that studies the process behind solar flares, Northern lights and other space phenomena, proposed the use of a wall-less segmented electrode system to power a CubeSat. Simmonds and his team of undergraduate students working under the guidance of Prof. Daniel Marlow, the Evans Crawford 1911 Professor of Physics at Princeton, took up that proposal to develop a CubeSat and such a rocket -- a project that was halted near completion by the COVID-19 pandemic and that could be resumed in the future.

For further information visit.: <https://www.sciencedaily.com/releases/2021/12/211222153015.htm>

Researchers develop advanced catalysts for clean hydrogen production

Oregon State University research into the design of catalysts has shown that hydrogen can be cleanly produced with much greater efficiency and at a lower cost than is possible with current commercially available catalysts

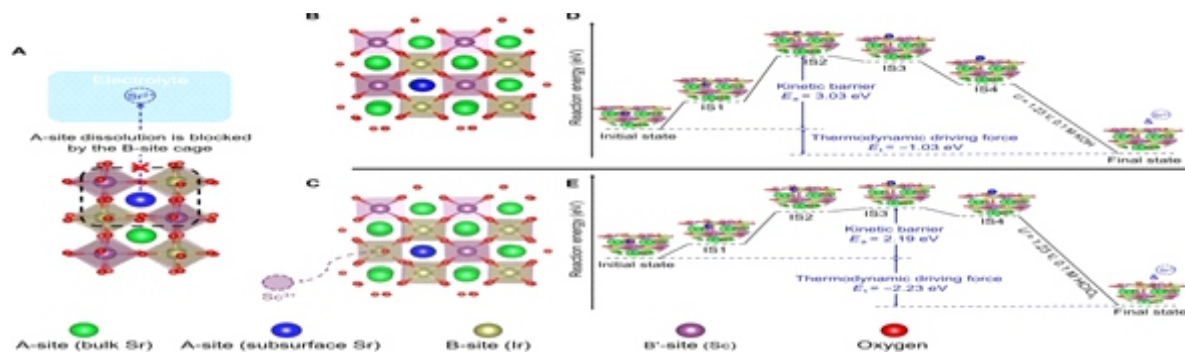


FIG. 1. Theoretical prediction of model perovskites' surface stability. (A) A schematic shows that the dissolution of A-site Sr (the blue ball), from the subsurface layer of SSI to electrolyte, can be kinetically blocked by the cage composed of B-site (Ir/Sc) octahedra. The Sr atom away from the surface is considered as bulk Sr (the green ball). (B and C) Surface of SSI without (B) and with (C) a B-site (Sc) vacancy. (D and E) Energy diagrams that illustrate the dissolution of A-site (Sr) from the subsurface of SSI without (D) and with (E) a B-site (Sc) vacancy. In (B) to (E), for a better illustration, only the selected subsurface Sr atom, which migrates to the outer surface, is marked with blue color. All the rest of subsurface Sr atoms are marked with green color. Courtesy: <https://www.science.org/doi/10.1126/sciadv.abk1788>

A catalyst is a substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change. The findings are significant because the production of hydrogen is important for "many aspects of our life, such as fuel cells for cars and the manufacture of many useful chemicals such as ammonia," said the OSU College of Engineering's Zhenxing Feng, a chemical engineering professor who led the research. "It's also used in the refining of metals, for producing human-made materials such as plastics and for a range of other purposes."

Producing hydrogen by splitting water via an electrochemical catalytic process is cleaner and more sustainable than the conventional method of deriving hydrogen from natural gas via a carbon-dioxide-producing process known as methane-steam reforming, Feng said. But the cost of the greener technique has been a barrier in the marketplace.

"Catalysts are critical to promoting the water-splitting reaction by lowering the overpotential, and thus lowering the total cost for hydrogen production," Feng said. "Our first study in JACS Au laid the foundation for us, and as demonstrated in our Science Advances article we now can better manipulate atoms on surface to design catalysts with the desired structure and composition."

For further information visit: <https://www.sciencedaily.com/releases/2021/12/211210140714.htm>

N-type conductive tin sulfide thin films: Towards environmentally friendly solar cells

Tin sulfide (SnS) is an abundant, safe, and environmentally friendly solar cell material. This inexpensive material is forecast to be used in next-generation solar cell panels.

A research group led by Issei Suzuki and Sakiko Kawanishi, assistant professors at Tohoku University's Institute of Multidisciplinary Research for Advanced Materials, has fabricated n-type conductive SnS thin films by impurity doping for the first time.

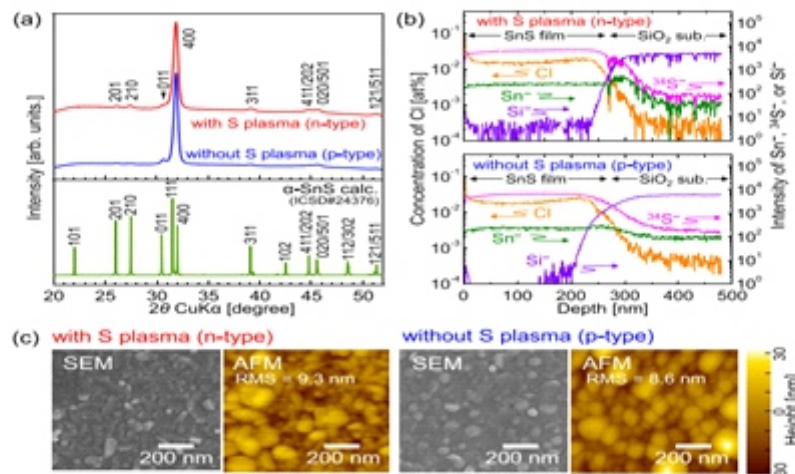


FIG. 1. Structural, compositional, and morphological analysis of Cl-doped SnS thin films deposited with and without a sulfur plasma supply. (a) X-ray diffraction (XRD) profiles of films deposited at $T_{\text{sub}} = 333^\circ\text{C}$, together with a reference pattern of α -SnS (ICSD#24376). (b) Depth profile of Cl concentration and normalized intensities of secondary ions of Sn^+ , $^{34}\text{S}^+$, and Si^+ in the films deposited at $T_{\text{sub}} = 333^\circ\text{C}$. (c) Scanning electron microscopy (SEM) and atomic force microscopy (AFM) images of the surface of SnS thin films deposited at $T_{\text{sub}} = 333^\circ\text{C}$. The root-mean-square (RMS) roughness is also shown. Additional SEM and AFM images are available in Fig. S6 in the Supplemental Material [16].

Courtesy: <https://journals.aps.org/prmaterials/pdf/10.1103/PhysRevMaterials.5.125405>

Conventional SnS thin films are usually p-type conductive. Thus, SnS thin-film solar cells have been fabricated using a pn heterojunction with p-type SnS thin film and other n-type semiconductor thin films, such as CdS. However, the conversion efficiency of such heterojunction devices has stagnated at approximately 5%, rendering their use impractical.

The SnS thin-film solar cells employing a pn homojunction, which uses SnS thin films for both p-type and n-type layers, is expected to exhibit higher conversion efficiency. Yet, n-type conductive SnS thin films without toxic elements have never been achieved before.

Utilizing chlorine-doping and a sulfur plasma supply, the research group reduced the lattice defects inhibiting the n-type conversion of SnS, realizing the world's first n-type SnS thin films without toxic elements.

"Our realization paves the way for practical pn homojunction SnS thin-film solar cells," said Suzuki.

For further information visit: <https://www.sciencedaily.com/releases/2021/12/211213121820.htm>

First model to predict lifetime risk of heart failure

By answering a few basic questions, a new heart failure-risk model can provide an on-the-spot estimate of whether an individual will experience heart failure in the next 30 years. The ability to identify who is at greatest risk for heart failure -- especially among high-risk young adult populations -- will allow physicians to start prevention measures sooner.

"Once someone develops symptoms of heart failure, the window for prevention has closed, which is a missed opportunity, given that the risk of dying in the five years after diagnosis is 50%, similar to a cancer diagnosis," said corresponding study author Dr. Sadiya Khan, assistant professor of cardiology and epidemiology at Northwestern University Feinberg School of Medicine and a Northwestern Medicine physician.

"These new models offer the opportunity for clinicians and patients to begin discussions at the individual level for opportunities to start prevention earlier in the life course," Khan said. "This moves the field forward by offering a precision approach to prevention and moving beyond risk associated with having or not having hypertension or diabetes."

Since it is well known that risk of heart failure differs between Black and white men and women, the risk-prediction models were derived in each individual demographic subgroup, Khan said. For example, in an average 40-year-old non-smoker with an untreated systolic blood pressure of 140 mm Hg, which is high, and body mass index of 30 kg/m², which is considered obese, the risk of developing heart failure was estimated to be 22.8% in a Black man, 13.7% in a white man, 13.0% in a Black woman, and 12.1% in a white woman.

For further information visit: <https://www.sciencedaily.com/releases/2021/12/211221162720.htm>

Automatic, non-invasive identification of Holstein cows by their coat pattern

Computer scientists have devised a methodology that can recognize Holstein cows in the milking station by the pattern of their coat using artificial intelligence. The long-term vision is to develop a system that can monitor Holstein cows continuously and anywhere on a farm.

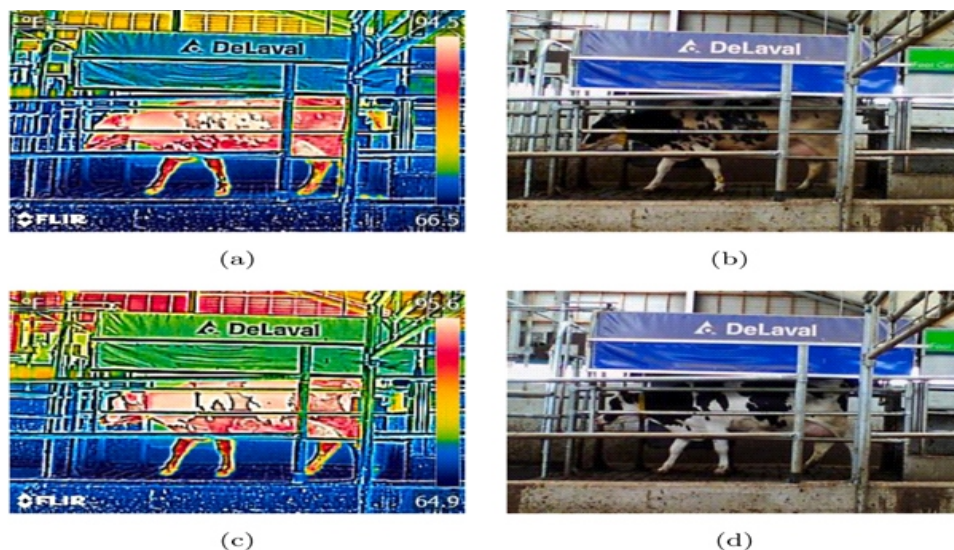


Fig. 1. Examples of pairs of thermal MSX and RGB images acquired simultaneously by the FLIR E6 thermal camera from a distance of five meters. (a–b) Images of the cow with ID 0094 and (c–d) images of the cow with ID 0099 were taken from the new data set. Courtesy:

<https://www.sciencedirect.com/science/article/pii/S0957417421016511?via%3Dihub#fig1>

To further improve animal husbandry and livestock management, there is an urgent need to continuously collect phenotype data from individual animals. George Azzopardi, a computer scientist from the University of Groningen, is leading a team that has devised a methodology that can recognize Holstein cows in the milking station by the pattern of their coat using artificial intelligence. The long-term vision is to develop a system that can monitor Holstein cows continuously and anywhere on a farm.

Azzopardi explains that there are several advantages in using imaging instead of RFID tags or collars to identify cows. 'First, it is non-invasive and, thus, better for the welfare of the animals. Second, it is cheaper, as farmers don't have to buy and manage collars or tags. And third, it is functionally and financially scalable: if the number of cattle on a farm increases, there is no need for extra collars. You would only need a few images of the new cows and use them to update the parameters of the respective classification model.'

For further information visit: <https://www.sciencedaily.com/releases/2021/12/211215113304.htm>

IT security: Computer attacks with laser light

Computer systems that are physically isolated from the outside world (air-gapped) can still be attacked. This is demonstrated by IT security experts. They show that data can be transmitted to light-emitting diodes of regular office devices using a directed laser. With this, attackers can secretly communicate with air-gapped computer systems over distances of several meters. In addition to conventional information and communication technology security, critical IT systems need to be protected optically as well.

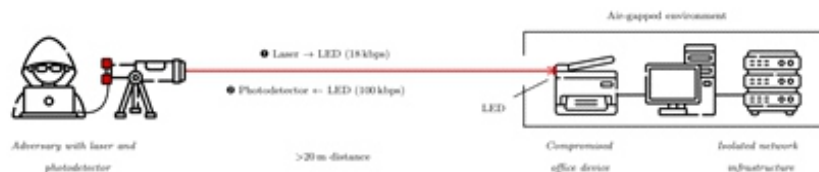


Figure 1: Schematic depiction of a bidirectional covert channel using a device's LED. ● Inbound communication (data infiltration) is established through a laser. ● Outbound communication (data exfiltration) is received by an avalanche photodetector.

Courtesy: <https://intellisec.de/pubs/2021-acsac.pdf>

Hackers attack computers with lasers. This sounds like a scene from the latest James Bond movie, but it actually is possible in reality. Early December 2021, researchers of KIT, TU Braunschweig, and TU Berlin presented the LaserShark attack at the 37th Annual Computer Security Applications Conference (ACSAC). This research project focuses on hidden communication via optical channels. Computers or networks in critical infrastructures are often physically isolated to prevent external access. "Air-gapping" means that these systems have neither wired nor wireless connections to the outside world. Previous attempts to bypass such protection via electromagnetic, acoustic, or optical channels merely work at short distances or low data rates. Moreover, they frequently allow for data exfiltration only, that is, receiving data.

Hidden optical channel uses LEDs in commercially available office devices. The Intelligent System Security Group of KASTEL -- Institute of Information Security and Dependability of KIT, in cooperation with researchers from TU Braunschweig and TU Berlin, have now demonstrated a new attack: With a directed laser beam, an adversary can introduce data into air-gapped systems and retrieve data without additional hardware on-side at the attacked device. "This hidden optical communication uses light-emitting diodes already build into office devices, for instance, to display status messages on printers or telephones," explains Professor Christian Wressnegger, Head of the Intelligent System Security Group of KASTEL. Light-emitting diodes (LEDs) can receiving light, although they are not designed to do so.

Data Are Transmitted in Both Directions. By directing laser light to already installed LEDs and recording their response, the researchers establish a hidden communication channel over a distance of up to 25 m that can be used bidirectionally (in both directions). It reaches data rates of 18.2 kilobits per second inwards and 100 kilobits per second outwards. This optical attack is possible in commercially available office devices used at companies, universities, and authorities. "The LaserShark project demonstrates how important it is to additionally protect critical IT systems optically next to conventional information and communication technology security measures," Christian Wressnegger says.

For further information visit: <https://www.sciencedaily.com/releases/2021/12/21221102721.htm>

Forthcoming Tech Events

Pakistan

Pakistan Science Expo

Pakistan Science Foundation, Ministry of Science & Technology
28th-29th, January, 2022, Pak-China Friendship Center, Islamabad

Build 2022 Construction Trade Fair

Rawalpindi Chamber of Commerce and Industry (RCCI)
11th-13th, February, 2022, Pak-China Friendship Center, Islamabad
<https://rcci.org.pk/>

International Conference on Science, Engineering & Technology - ICSET 2022

Researchfora.
28th - 29th January, 2022, Rawalpindi
<http://researchfora.com/Conference2022/Pakistan/1/ICSET/>

World Congress on Industrial Biotechnology (WCIB)

12th-13th January, 2022, Multan

International Conference on Engineering & Technology

World Academics
3rd January, 2022, Faisalabad
<https://worldacademics.net/event/index.php?id=1516336>

International

IMPACT 2022

31st January, 2022
Virtual
<https://cmgimpact.com/>

MicroStrategy World 2022

1st February, 2022
Virtual
<https://www.microstrategy.com/en/world-2022>

Developer Week

Oakland, CA
2nd February, 2022
<https://www.developerweek.com/>

Digital Geospatial Intelligence (DGI)

London, UK
7th-9th February, 2022
<https://dgi.wbresearch.com/>

Tech & Trade Offers

GREENOVATION

Greenovation is Pakistan's first plastic waste recycling company; we recycled plastic into Liquefied Petroleum Gas. Through this way we not only aim to clean waste from Pakistan but also help Pakistan in fulfilling its current energy demand. The unique point is we are producing LPG by recycling plastic waste instead of extracting from the earth. As plastic waste is now a global issue, so the possibilities of going global are very high especially in third world countries.

Services:

Commercial Fuel

Greenovation will offer online portals in addition to retailers and local distributors for easy access to LPG in households, commercial regions and in industries.

Waste Management

Greenovation provides waste management solution by collaborating with the local government body in form of using the non-bio degradable plastic waste as a fuel for the conversion process.

Thermal Insulation

Thermal Insulating Wax is the major by-product of the conversion process and constitutes about 20% of the total waste. This product can be used in houses and industries to for thermal insulation reducing the overall need for power consumption that is required in heating and cooling of the building.

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About PASTIC

PASTIC serves as a gateway for Scientific & Technological Information for R&D by catering to the information needs of researchers, entrepreneurs, industrialists, educationists, policy makers and planners through anticipatory and responsive information services.

Technology Information Section works exclusively for support and promotion of technological information on trade and industry in the country. "Technology Roundup" is a news bulletin that provides latest and innovative technology news, forthcoming events, etc. It also promotes products, technologies and services globally in sectors such as Agro-Industry, Bio-Technology, Building Material, Business, Chemicals, Electronics, Energy, Fisheries, Food Processing, Machinery, Packaging, Mining Pharmaceuticals and Textiles.