

Weekly Discovery

We SHARE to inspire and ignite ideas!

22 - 26 May 2023

ARCHITECTURE

Straw Bale House Is a Straw-And-Timber Duplex in The German Countryside



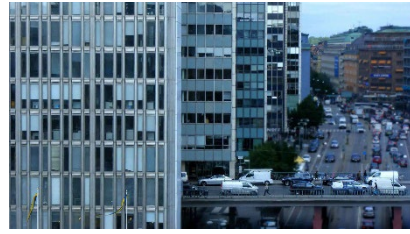
"Atelier Kaiser Shen has used straw bale-construction to create an interlocking semi-detached house in the village of Pfaffenhofen, Germany.

Appropriately named Straw Bale House, the dwelling near Heilbronn uses the material as insulation to improve the building's thermal performance."

Source: [Dezeen](#) (8 May 2023)

ARCHITECTURE

Even Weak Traffic Noise Has a Negative Impact on Work Performance



"As Swedish cities are densified at a fast pace, there is now construction very close to roads and thoroughfares – land that was considered unthinkable for development just a decade ago. It is already known that noise can have a negative impact on human health, but new research from Chalmers University of Technology shows that as little as 40 decibels of traffic noise – the typical level of background noise in an office environment or kitchen – has a detrimental effect on cognitive performance.

Researchers at Chalmers' Division of Applied Acoustics have conducted a laboratory study in which test subjects took concentration tests while being exposed to background traffic noise. The subjects were asked to look at a computer screen and react to certain letters, then to assess their perceived workload afterwards. The study shows that the subjects had significantly poorer results on the performance test, and also felt that the task was more difficult to carry out, with traffic noise in the background."

Source: [Chalmers](#) (19 May 2023)

BIOTECHNOLOGY

A Soft E-Skin Mimics the Way Human Skin Can Sense Things



"A soft electronic skin could allow people with prosthetics to sense pressure and temperature, helping them to interact with their surroundings more easily.

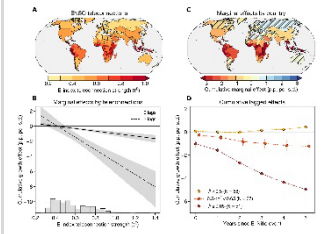
Thin and stretchable like regular skin, the electronic skin sticks to surfaces like a Band-Aid. It contains sensors to measure external temperature and pressure, which it sends to an implanted electrode in the brain in the form of electrical signals. These signals vary in frequency to help the brain tell the difference between sensations like a softer touch and a firm handshake, a strawberry, and an apple, or hot and cold.

It was created by a team of researchers from Stanford University, who implanted soft e-skin electrodes in the brains of rats and recorded electrical signals from the animals' motor cortex, the region of the brain responsible for conducting voluntary movements. The animals twitched their legs in response to different levels of pressure recorded by the brain, depending on the strength of the stimulation frequency, demonstrating that the e-skin was able to detect differing levels of pressure in the same way that animals and humans can do ordinarily."

Source: [MIT Technology Review](#) (18 May 2023)

CLIMATE

Persistent Effect Of El Niño on Global Economic Growth

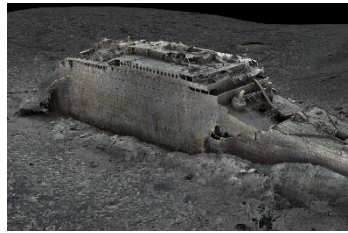


"El Niño–Southern Oscillation (ENSO) shapes extreme weather globally, causing myriad socioeconomic impacts, but whether economies recover from ENSO events and how anthropogenic changes to ENSO will affect the global economy are unknown. Here we show that El Niño persistently reduces country-level economic growth, attributing \$4.1T and \$5.7T in global income losses to the 1982–83 and 1997–98 events, respectively. Increased ENSO amplitude and teleconnections from warming cause \$84T in 21st-century economic losses in an emissions scenario consistent with current mitigation pledges, but these effects are shaped by stochastic variation in the sequence of El Niño and La Niña events. Our results highlight the sensitivity of the economy to climate variability independent of warming and the potential for future losses due to anthropogenic intensification of such variability."

Source: [AAAS Science](#) (8 May 2023)

DIGITAL TWIN

'Digital Twin' of the Titanic Shows the Shipwreck in Stunning Detail



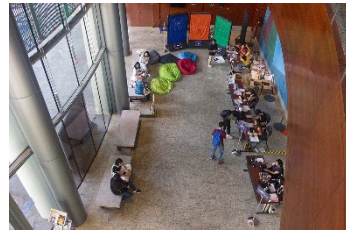
"An ambitious digital imaging project has produced what researchers describe as a "digital twin" of the R.M.S. Titanic, showing the wreckage of the doomed ocean liner with a level of detail that has never been captured before.

The project, undertaken by Magellan Ltd., a deepwater seabed mapping company, yielded more than 16 terabytes of data, 715,000 still images and a high-resolution video. The visuals were captured over the course of a six-week expedition in the summer of 2022, 2.4 miles below the surface of the North Atlantic, Atlantic Productions, which is working on a documentary about the project, said in a news release.

Source: [New York Times](#) (17 May 2023)

EDUCATION

Why Asian Universities Are Embracing US Liberal Arts Programs



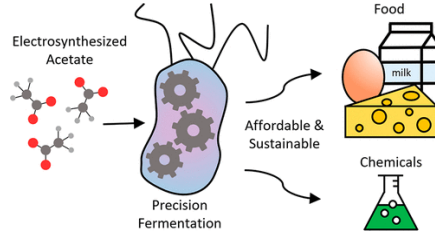
"Ask any educator what sets American higher education apart from the rest of the world, and the response is likely to be its focus and encouragement of a robust liberal arts curriculum. The arts, in general, play a large role in contributing to holistic education that fosters creativity, highlights the importance of collaboration for skill development, and teaches innovative problem-solving. Further, through exposure to the arts, one can learn to appreciate cultural diversity and value freedom of expression while cultivating critical thinking skills, which eventually, have been known to change lives. This is why UNESCO has designated the fourth week of May as International Arts Education Week.

Yet, in the early years of this century, it seemed that the United States was shifting focus from promoting liberal arts education. These "worrying signs" of the United States "turning away from the tradition of liberal arts education that has made it a global leader in post-secondary education over the past century," were noted by Pericles Lewis, the President of Yale-NUS College, Singapore, in a 2013 essay published in the Harvard International Review."

Source: [JSTOR](#) (6 May 2023)

ELECTROCATALYSTS

Turning Carbon Dioxide into Sustainable Food and Chemicals: How Electro-Synthesised Acetate Is Paving the Way for Fermentation Innovation

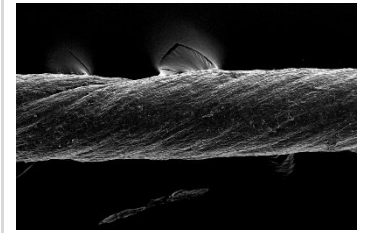


"The agricultural and chemical industries are major contributors to climate change. To address this issue, hybrid electrocatalytic–biocatalytic systems have emerged as a promising solution for reducing the environmental impact of these key sectors while providing economic onboarding for carbon capture technology. Recent advancements in the production of acetate via CO₂/CO electrolysis as well as advances in precision fermentation technology have prompted electrochemical acetate to be explored as an alternative carbon source for synthetic biology. Tandem CO₂ electrolysis coupled with improved reactor design has accelerated the commercial viability of electro-synthesised acetate in recent years. Simultaneously, innovations in metabolic engineering have helped leverage pathways that facilitate acetate upgrading to higher carbons for sustainable food and chemical production via precision fermentation. Current precision fermentation technology has received much criticism for reliance upon food crop-derived sugars and starches as feedstock which compete with the human food chain. A shift toward electro-synthesised acetate feedstocks could help preserve arable land for a rapidly growing population."

Source: [ACS](#) (19 May 2023)

HEALTHCARE TECH

Engineers Design Sutures That Can Deliver Drugs or Sense Inflammation



"Inspired by sutures developed thousands of years ago, MIT engineers have designed "smart" sutures that can not only hold tissue in place, but also detect inflammation and release drugs.

The new sutures are derived from animal tissue, similar to the "catgut" sutures first used by the ancient Romans. In a modern twist, the MIT team coated the sutures with hydrogels that can be embedded with sensors, drugs, or even cells that release therapeutic molecules.

"What we have is a suture that is bioderived and modified with a hydrogel coating capable of being a reservoir for sensors for inflammation, or for drugs such as monoclonal antibodies to treat inflammation. Remarkably, the coating also has the capacity to retain cells that are viable for a prolonged period," says Giovanni Traverso, an associate professor of mechanical engineering at MIT, a gastroenterologist at Brigham and Women's Hospital, and the senior author of the study."

Source: [MIT](#) (16 May 2023)

MATERIAL

Researchers Build World's First House Made with Nappy-Blended Concrete



"In an attempt to solve two environmental problems at once, researchers at the University of Kitakyushu in Japan have found that shredded nappies can be used to replace between 9 and 40% of the sand used in making concrete without reducing its strength. Disposable nappies are a growing source of non-recyclable waste, and cement production is responsible for almost 7% of global greenhouse-gas emissions and consumes around 50 billion tonnes of sand each year.

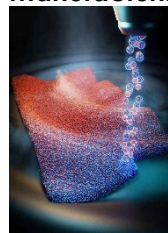
The nappy-infused concrete was used to build a small house in Indonesia, to demonstrate how this type of waste could be diverted from landfills to build more affordable housing in low- and middle-income communities.

Siswanti Zuraida, a civil engineer at the University of Kitakyushu, began the project while lecturing at the Bandung Science Technology Institute near Jakarta. Although population numbers in wealthy countries often plateau and decline, those in Indonesia and other low- and middle-income countries will continue growing — leading to more babies, more nappies, and more demand for low-cost housing."

Source: [Nature](#) (20 May 2023)

MATERIALS

Novel 3D printing method a 'game changer' for discovery, manufacturing of new materials



"It usually takes 10 to 20 years to discover a new material," said Yanliang Zhang, associate professor of aerospace and mechanical engineering at the University of Notre Dame.

"I thought if we could shorten that time to less than a year — or even a few months — it would be a game changer for the discovery and manufacturing of new materials."

Now Zhang has done just that, creating a novel 3D printing method that produces materials in ways that conventional manufacturing can't match. The new process mixes multiple aerosolized nanomaterial inks in a single printing nozzle, varying the ink mixing ratio on the fly during the printing process. This method — called high-throughput combinatorial printing (HTCP) — controls both the printed materials' 3D architectures and local compositions and produces materials with gradient compositions and properties at microscale spatial resolution.

Source: [ND](#) (15 May 2023)

SUSTAINABILITY

Automated Window Shades Show Potential for Significant Energy Savings, Illinois Tech Study Finds



"Automated insulating window shades can cut energy consumption by approximately one-quarter and may recoup the cost of installation within three to five years, according to a landmark study conducted by Illinois Institute of Technology researchers at Willis Tower. The study, funded by ComEd, showcases a promising path for sustainability and energy efficiency in architectural design.

Temperature regulation typically accounts for 30–40 percent of the energy used by buildings in climates similar to Chicago. The research team, led by Assistant Professor of Architectural Engineering Mohammad Heidarinejad, focused on the role of window shades, which are often overlooked in energy-savings solutions. The findings underscore how insulating window shades, when connected to an automated control system, can dramatically reduce energy consumption in both heating and cooling seasons."

Source: [IIT](#) (17 May 2023)

VR

Smellovision Gets a Refresh



"Chinese researchers published a paper in Nature Communications that details a small, soft, wireless olfactory device that might finally give your sniffer something to do. The key breakthrough is a "miniaturized odour generator" small enough to slip inside a flexible face mask.

Countless inventors and researchers have tried to popularize "smellovision" in whatever incarnation—whether in its hyphenated Smell-O-Vision cinematic form or in various other olfactory tech offshoots—with little success. The earliest example is an 1868 stage performance in London that reportedly sprayed scents from fragrance giant Rimmel, at the time a local boutique, into the crowd. Modern examples are far more complex. But an effective, affordable solution for delivering smells on demand remains elusive."

Source: [IEEE](#) (19 May 2023)