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HEALTH-TECH NEWS

AI tool being tested for faster, more accurate diagnosis of diseases

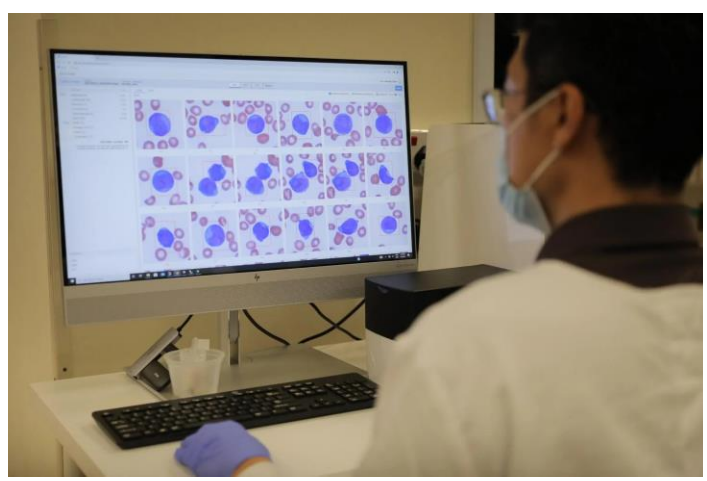
Source: https://www.straitstimes.com/singapore/health/ai-tool-being-tested-for-faster-more-accurate-diagnosis-of-diseases

Diagnosing leukaemia as well as diseases such as malaria may soon be faster and more accurate with the use of artificial intelligence (AI).

An AI-powered software dubbed Blade - developed by Tan Tock Seng Hospital (TTSH) and Taiwanese tech firm Asus - can cut the time needed to analyse blood for these diseases by half, allowing for earlier clinical intervention for patients.

The process currently requires a laboratory technologist to examine a patient's blood, which is placed on a piece of film under a microscope, and perform a manual cell count. Those blood films with abnormal features or unclear diagnosis are sent to a reference laboratory or a haematologist for review. Blade allows for the procedure to be automated, enabling a technologist to load multiple blood films into a scanner that converts them into digital images.

The AI analyses the films and flags critical ones, such as cases of leukaemia. Lab technologists need only review the scans and correct any misclassified cases, said a principal investigator in the eight-member team studying the use of Blade. He compares the identification of critical cases by Blade to tagging people on Facebook, noting this is made possible by lab technologists painstakingly labelling individual cells over the past three years.



The AI analyses blood films and flags critical ones, such as cases of leukaemia. ST PHOTO: ONG WEE JIN

Blade is currently being evaluated at TTSH and other sites, with plans for it to gain regulatory approval in the next few years. The team aims to test Blade in a community setting, with NHG's Hougang Polyclinic - which has its own laboratory where blood films are examined - expected to get the software this month.

Asus and TTSH are also looking at developing similar AI-based solutions in the fields of pathology, cytology and microbiology. Other projects in the works include those targeting breast and colon cancer detection.

Singapore Scientists use collagen from bullfrog skin to heal chronic wounds

Source: https://www.techinasia.com/collagen-discarded-bullfrog-skin-heal-wounds-skin

Scientists at Nanyang Technological University (NTU) and medtech firm Cuprina Wound Care Solutions (Cuprina) have developed clinical-grade collagen from discarded bullfrog skin to treat chronic wounds and other skin healing issues. As part of the collaboration, Cuprina has received an exclusive license to scale up the commercial production of the collagen product. This complements the firm’s Medifly offering, which uses medical-grade maggots to make wound dressings. Scaling up efforts will include setting up a lab in Singapore that will adopt NTU’s collagen extraction and dressing development processes.

According to scientists, skin healing comes in three phases: inflammatory, proliferative, and maturation. During the first phase, Cuprina’s Medifly works with enzymes produced by the body to clean up and disinfect the wound, allowing the body to leverage the maximum effect of the new collagen patch. For the second phase, the collagen patch aims to provide a scaffold for the white blood cells and healing agents to coagulate and form a protective layer for the healing to begin. In the final phase, the collagen patch helps with faster recovery by ensuring the wound is moist and serves as a “building block” material for the skin to heal.

ENVIRO-TECH NEWS

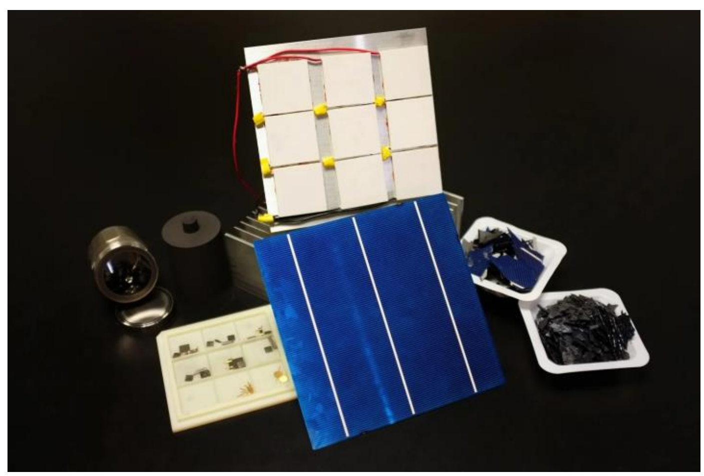
Scientists from A*Star, NTU find way to upcycle old solar panels

Source: https://www.straitstimes.com/singapore/environment/scientists-from-astar-ntu-find-way-to-upcycle-old-solar-panels

Recycling old solar panels is challenging, but scientists from Singapore have found a way to upcycle the silicon inside and turn them into materials that can convert heat into electricity. The team comprising researchers from the Agency for Science, Technology and Research (A*Star) and Nanyang Technological University (NTU) turned old solar panels into thermoelectric materials. Such materials convert heat into electricity, and work in a similar way to how hydropower generation plants use water movement to drive turbines to generate electricity.

The deputy head of the soft materials research department at A*Star's Institute of Materials Research and Engineering said that by moving heat from one side to another, thermoelectric materials generate electricity. This can then be used for applications like cooling. The team found that impurities and defects in the silicon used to make solar cells actually enhance the performance of thermoelectric materials.

Solar cells contain a complex mix of materials such as aluminium, copper, silver, lead, plastic and silicon. While silicon holds very little weight in the entire solar panel, it is the most valuable part of it, which explains why it is important for us to try and upcycle it.



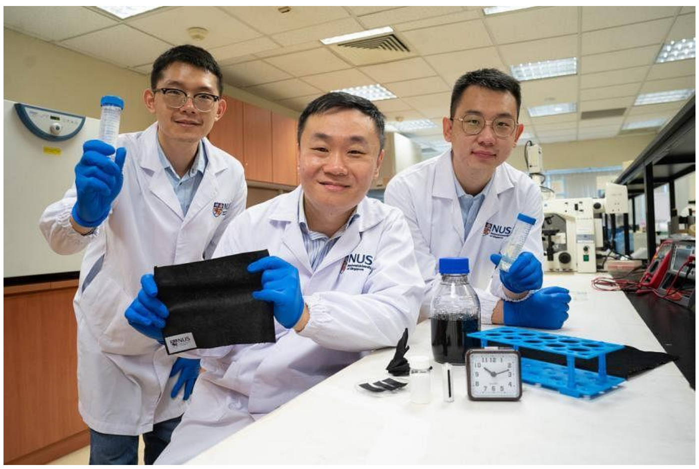
*Upcycling of solar panels (bottom) into valuable heat-harvesting electricity materials such as thermoelectric modules (top). PHOTO: A*STAR*

The team is currently looking to pilot the technology for large-scale upcycling of waste silicon to create silicon-based thermoelectrics. This can be used for high-temperature energy harvesting applications such as converting heat generated from industrial waste processes into electricity.

There are a number of research efforts ongoing in Singapore to see how solar panels can be recycled. The NTU project, for example, is one of two currently supported by the National Environment Agency's (NEA) Closing the Waste Loop funding initiative. The other project, a recycling programme led by Singapore Polytechnic (SP), aims to recycle solar panels on a commercial scale and recover more than 90 per cent by weight of the materials from the solar panels, said NEA. The upcoming projects aim to recover materials from decommissioned solar panels so they can be recycled and reutilised as raw materials for battery, solar panel manufacturing and other industrial applications.

NUS team invents self-charging battery that creates electricity from humid air

Source: https://www.straitstimes.com/singapore/nus-team-invents-self-charging-battery-that-generates-electricity-from-humid-air



(From left) Dr Zhang Yaoxin, Assistant Professor Tan Swee Ching and Mr Qu Hao with the self-charging battery. ST PHOTO: SYAMIL SAPARI

What if you could wear a health monitoring device that powers itself using Singapore's humid weather?

This futuristic-sounding scenario might soon become a reality with a battery invented by researchers from the National University of Singapore (NUS) that harvests water in the air for electricity. Apart from having a higher voltage than conventional chemical batteries, the novel device is made from non-toxic and eco-friendly materials including sea salt, eliminating a source of e-waste, said an Assistant Professor from NUS' Department of Materials Science and Engineering, who led the team of researchers.

Singapore generates about 60,000 tonnes of e-waste annually, equivalent to each person throwing away about 70 mobile phones each year. The origins of the moisture-electricity generation device (MEG) can be traced to a chance experimentation in 2020, said a research fellow at NUS' Department of Materials Science and Engineering.

While tinkering with materials in the lab, the team accidentally discovered that electricity could be generated from an interaction between a wet and dry surface, he said.

Using this principle, the team crafted its MEG comprising a layer of fabric - about 0.3mm in thickness - sea salt, carbon ink, and a water-absorbing gel. When three pieces of fabric were placed together, the voltage of the assembled device was tested to reach as high as 1.96V - more than a commercial AA battery of about 1.5V - which is sufficient to power small electronic devices. So far, the team has trialled the fabric-based battery on small electronic devices including a watch and an alarm clock.

MEGs produce voltage through the difference in electrical potential between a negatively charged dry surface and a positively charged wet surface. In the NUS battery, this asymmetry is created by coating one end of the battery with the hydrogel that constantly absorbs water from the air, rendering it perpetually wet while the opposite end stays dry. The battery's design allows for high water content in the wet region and zero water content in the dry region to be maintained, sustaining electrical output for as long as 30 days in a humid environment.

In the battery designed by the NUS researchers, the hydrogel locks in the absorbed water, such that the asymmetry can be maintained for a longer period of time. The low fabrication cost of about 15 cents per sq m and use of readily available raw materials make the MEG suitable for mass production.

Having filed the technology's patent, the team is looking for investors to further its research and hope to increase the battery's power input by experimenting with new materials. The battery, a novel invention from Nanyang Technological University's School of Materials Science and Engineering provides a new possible way to power small electronics.

Velvet worm proteins sequenced at last: One step closer to becoming a bioplastic

Source: https://www.straitstimes.com/singapore/environment/velvet-worm-proteins-sequenced-at-last-one-step-closer-to-becoming-a-bioplastic

Velvet worms are the carnivorous cowboys of the invertebrate world, using slime "ammunition" to catch prey. This sticky substance, touted as a possible plastic replacement, is squirted out of two "muskets" from the sides of the worm's mouth. It is famed for its ability to harden to trap prey in a string-like web as strong as nylon, and also dissolve completely when exposed to water. The exact composition of the slime has so far eluded scientists, but a team of scientists from Nanyang Technological University (NTU) have just uncovered the exact constitution of proteins in the slime. This brings the slime from the endangered worm a step closer towards having commercial viability as a biodegradable plastic or adhesive.

The velvet worm of the Phylum Onychophora and Genus Eoperipatus. ST PHOTO: LIM YAOHUI

The supervisor of the study said, it was understood that the hardening mechanism behind the slime was caused by the sudden assembly of many different slime proteins into a larger complex, known as a biopolymer, under certain conditions. He added that charting the exact sequence of amino acids in these polypeptides would therefore allow them to study how exactly these proteins interact with one another to give rise to the slime's unique qualities. As part of the sequencing research, NTU scientist from MSE, discovered that a short section of one protein contributed to the slime forming tiny droplets, like oil in water. This section, known as the N-Terminus, or the extremity of a protein, was instrumental in enabling the proteins to form the droplets surrounded by water.

These droplets are like "islands" of concentrated amounts of proteins that make the slime very viscous but not solid, so that it can be stored by the animal in its body before ejection. This discovery would not have been possible if they did not have the complete amino acid sequence. While the team recognise their achievement, they acknowledge that this research is still far away from being incorporated into a consumable product. It is estimated that around five more years of work will be required before an artificial version of the slime can be manufactured for larger scale. Further proof-of-concept experiments will then have to be done on the artificial slime before it is ready for commercial use.

Network of crude slime fibers from the velvet worm. ST PHOTO: LIM YAOHUI