SCIENCE

Wearable battery is flexible, stretchable and sweat-powered

By Ben Coxworth
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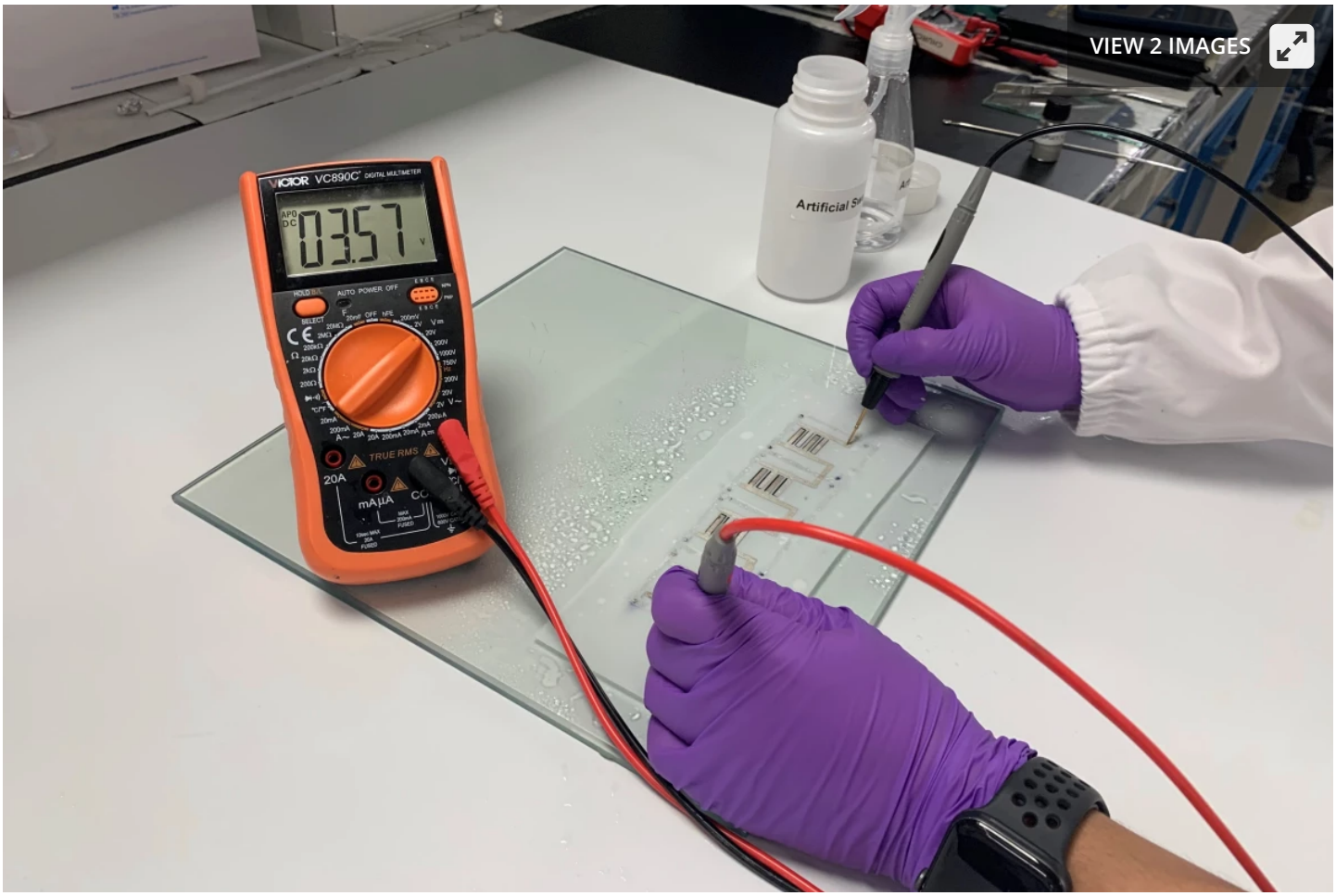


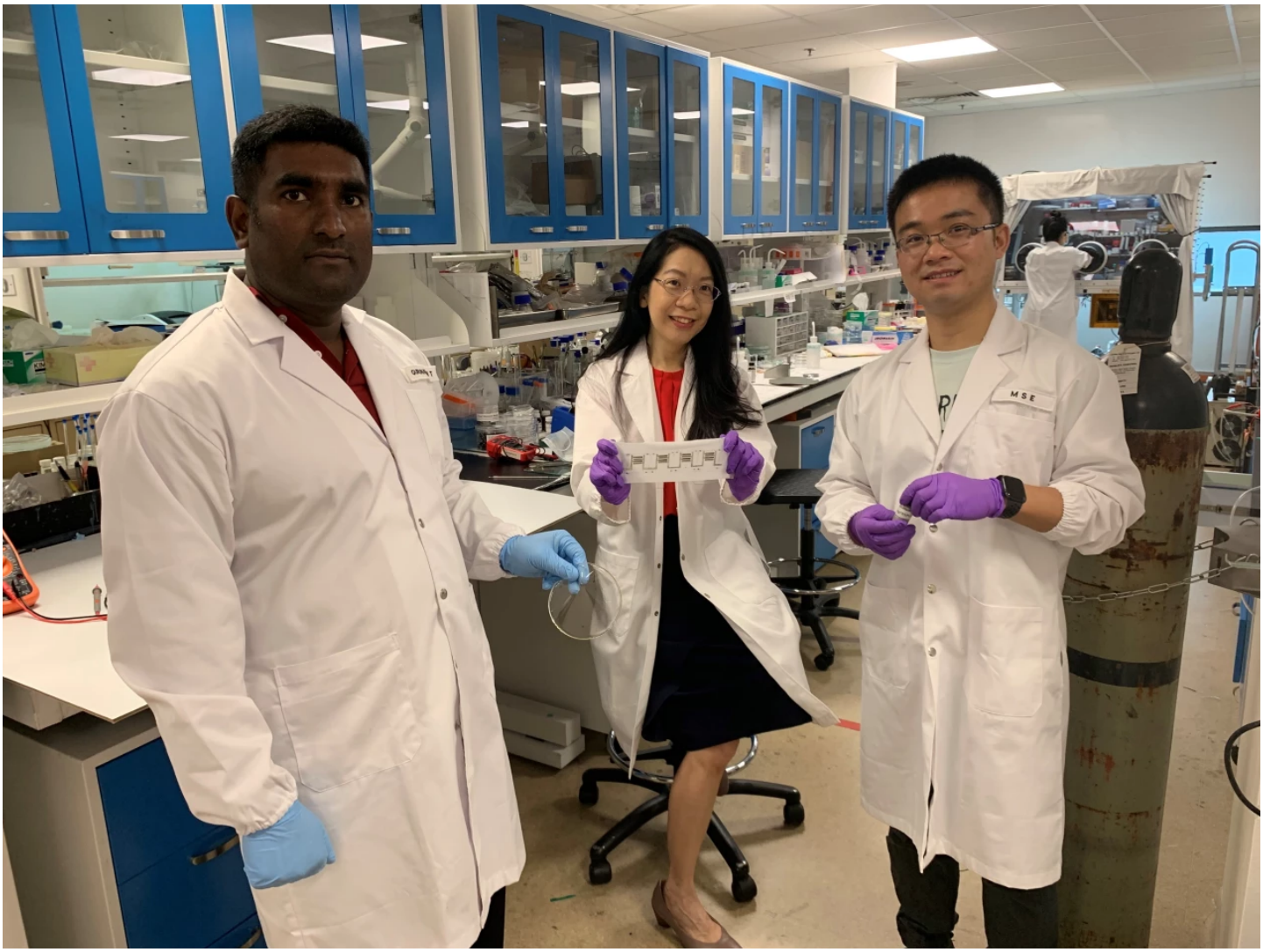
After being sprayed with artificial sweat, a strip of the batteries generated 3.57 volts of electricity
Nanyang Technological University

Although we do keep hearing about flexible wearable electronics, most such devices are still powered by rigid batteries that regularly need to be recharged. An experimental new battery, however, is soft, stretchable, and powered by human sweat.

Developed by scientists at Singapore's Nanyang Technological University, the battery measures 2 by 2 cm (0.8 by 0.8 in) and is printed onto a flat sweat-absorbent textile.

That textile can in turn be integrated into things like arm straps or wrist bands, which are linked to wearable devices such as smartwatches or biosensors. Because the textile substrate *is* so absorbent, it ensures that sweat is always available to the battery, even if the wearer's rate of perspiration is inconsistent.

The battery itself is made up of a hydrophilic (water-attracting) polymer known as poly(urethane-acrylate), along with microscopic flakes of silver. When exposed to the chloride ions and acidity of sweat, those flakes clump together. This chemical reaction increases the flakes' ability to conduct electricity, plus it causes an electric current to flow between them.



From left to right, team members Dr. Gurunathan Thangavel, Prof. Lee Pooi See and Dr. Lyu Jian

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In lab tests, the battery was worn on a volunteer's wrist as they pedaled a stationary bicycle for half an hour. Doing so allowed the device to generate a voltage of 4.2 volts and

output power of 3.9 milliwatts, which was sufficient to power a temperature sensor that continuously transmitted data to a smartphone via Bluetooth.

As an added bonus, the device contains no toxic chemicals or heavy metals, so it shouldn't contribute to the problem of harmful electronic waste.

"Our device could be more durable than current technology, as we showed it could

problems in wearable tech: traditional button batteries are a problem for achieving the sort of sleek aesthetics that are attractive to consumers, while thinner batteries reduce the item's ability to carry enough charge to last throughout the day."

The research is described in a paper that was recently published in the journal *Science Advances*. Scientists from Caltech and Binghamton University – among other places – are also developing sweat-powered wearable electronics.

Source: Nanyang Technological University

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