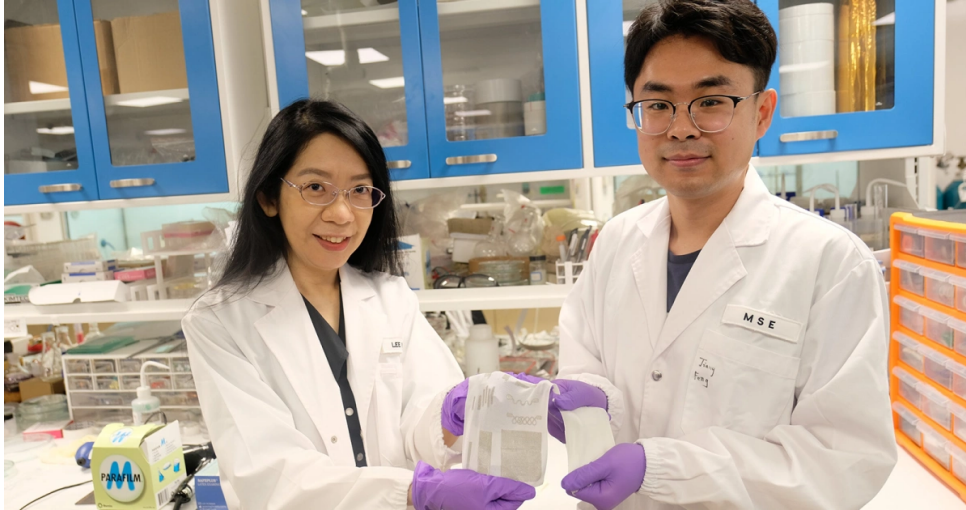


WASHABLE SMART FABRIC TURNS MOVEMENT INTO ELECTRICITY

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A new material that converts movement into electricity could one day allow you to charge your phone, watch or other wearable device simply by walking – and unlike other “smart fabrics” this material can work for months even after it’s been washed became.

The challenge: By embedding electronic components such as batteries, sensors or electrodes in fabrics, scientists have created garments that can monitor our health or convert our movements and body heat into electricity.

▮ *The smart fabric generates electricity from mechanical stress such as knocking, squeezing or stretching.*

There can be countless uses for such a system waiting to be explored. But although we’ve seen prototypes, the widespread use of Smart Fabric has been hampered by its lack of durability and reliability.

“[A] The big challenge was to design something that would not lose function after washing while maintaining excellent electrical performance,” said Lee Pooi See of Nanyang Technological University, Singapore (NTU Singapore).

That smart stuff: Lee has now led the development of a fabric that generates electricity when subjected to some type of mechanical stress, such as being tapped, squeezed or stretched.

In a proof-of-concept experiment, continuously tapping a small piece of cloth (less than 2 square inches) generated enough electricity to power 100 LEDs or charge capacitors used in common devices like phones.

▮ *“We think it could be woven into T-shirts or built into the soles of shoes to collect energy from the body’s smallest movements.”*

▮ *Lee Pooi Lake*

The smart fabric’s ability to produce electricity was stable for five months and was unaffected by washing, crumples or creases. Because it’s stretchy, waterproof and breathable, the NTU Singapore team believes the material could be conveniently incorporated into wearables.

“We think it could be woven into T-shirts or built into the soles of shoes to collect energy from the body’s smallest movements and relay power to mobile devices,” Lee said.

How it works: To create their smart fabric, the researchers started by making a stretchable electrode out of silver and a rubber-like material.

The electrode was attached to a fabric made of a polymer that generates electricity when compressed, bent or stretched (referred to as PVDF-HPF) and perovskites, a material used in solar cells and LEDs.



“Embed perovskites [...] increases the electrical performance of the prototype,” explains Lee.

“Although perovskites are inherently brittle, their integration into PVDF-HPF gives the perovskites exceptional mechanical durability and flexibility,” she added. “The PVDF-HPF also acts as an additional protective layer for the perovskites and contributes to their mechanical properties and stability.”

Looking ahead: It’s not clear how much it costs to make the smart stuff, and the NTU Singapore study doesn’t mention whether the team has plans to commercialize their technology.

However, based on the proof-of-concept experiment, it doesn’t seem like you need a large piece of cloth to generate a useful amount of electricity, and researchers are now looking at ways to adapt it to evenly harvest more types of energy.

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