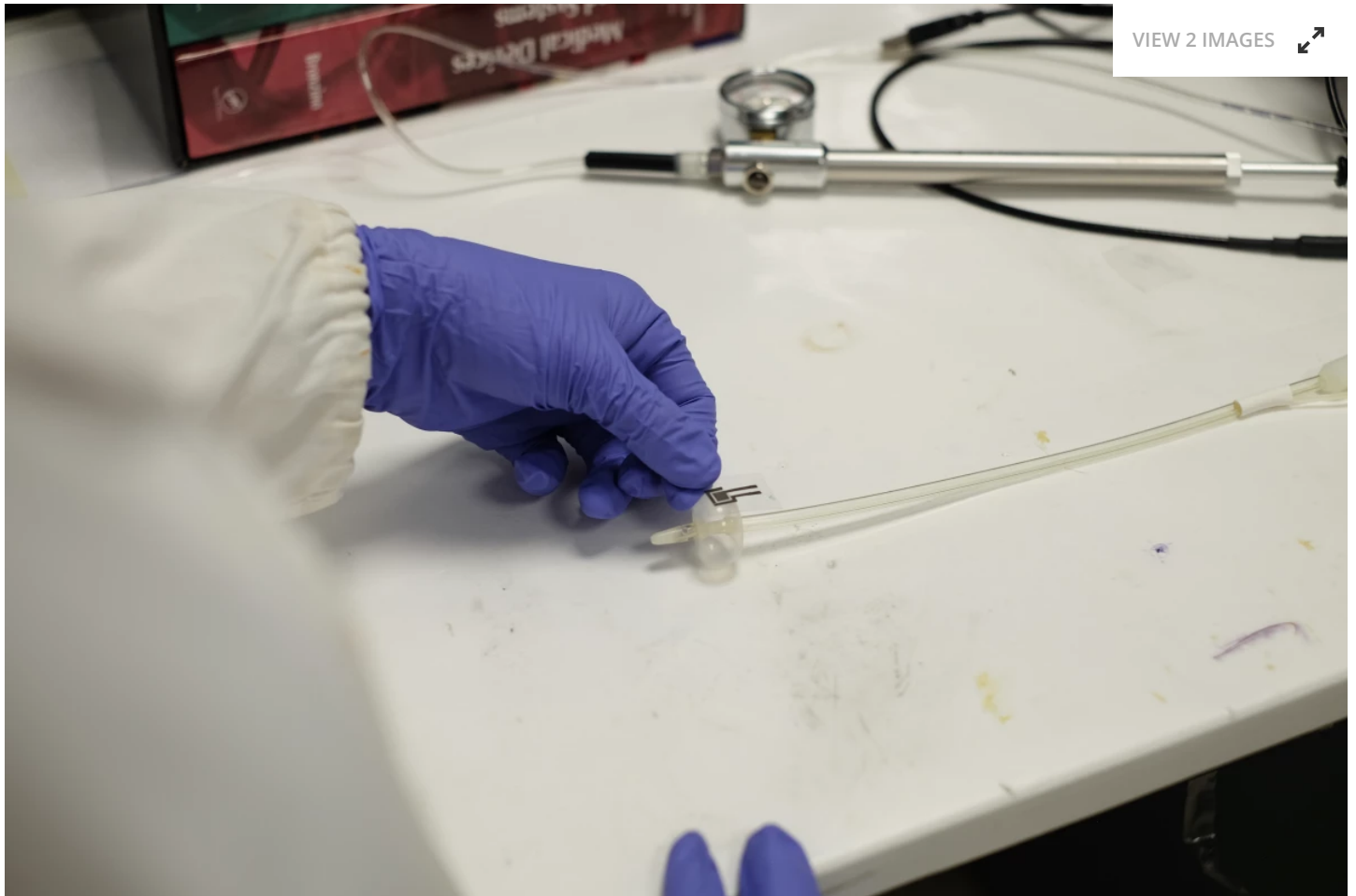




MEDICAL

Electrically activated glue patch repairs blood vessels from within

By Ben Coxworth
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VIEW 2 IMAGES

The CATRE hard-wired balloon catheter, with the ePATCH electrically activated patch at the left end Nanyang Technological University

Back in 2015, we heard about an [electrically activated glue](#) that could be used to bond items in wet conditions, or even underwater. Now, scientists have demonstrated that the material could be used to patch leaky blood vessels ... from the inside.

Named Voltaglue, the adhesive was first created by a team at Singapore's Nanyang Technological University, and has since been developed in partnership with MIT.

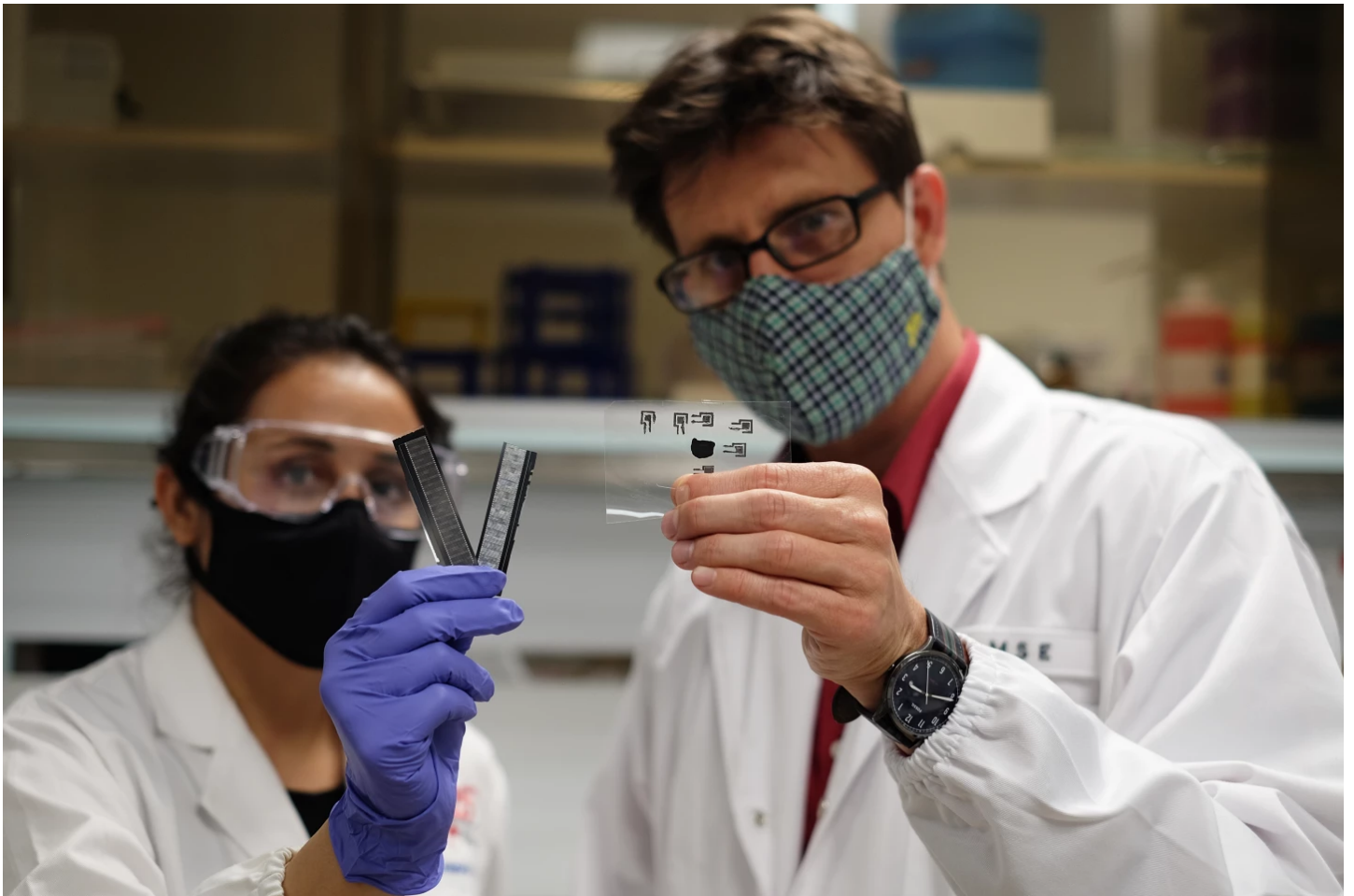
It takes the form of a hydrogel, which contains carbon molecules known as carbenes that are grafted onto tree-branch-shaped polymeric molecules called dendrimers. When the gel is subjected to an electrical charge, the carbenes are drawn towards any nearby surfaces. The dendrimers, which get dragged along with the carbenes, hook onto those surfaces, forming a bond.

The higher the charge, the stronger the bond becomes.

In recent experiments, a small Voltaglue-coated patch was applied to the end of a flexible balloon catheter, which was then inserted into a pig aorta. Although the blood vessel had been removed from the animal, it was hooked up to a mock heart and was subjected to continuous blood flow at a rate of 10 ml per minute.

Once the patch reached a 3-mm tear in the aorta, the balloon at the end of the catheter was inflated, pressing the patch up against the hole. Electrical wires running the length of the catheter were then used to deliver an electric charge to the Voltaglue on the patch, causing it to set and harden.

Within three to five minutes, the glue had sealed the patch over the hole. The catheter was then withdrawn, leaving the patch in place. Even after 1,000 simulated heartbeats, it stayed securely attached. That said, both the patch and the Voltaglue are designed to biodegrade and be harmlessly absorbed by the body within a few weeks, once the repaired blood vessel has had a chance to fully heal.



Former NTU PhD student Dr. Manisha Singh, now at MIT (left) and NTU's Assoc. Prof. Terry Steele with multiple examples of the patch – missing from the shot is co-inventor Assoc. Prof. Ellen Roche from MIT Nanyang Technological University

The technology has been patented, and is now being commercialized as the ePATCH electrically activated patch and the CATRE wired catheter. Along with its use in blood vessels, it could also be utilized in body parts such as the intestines and oesophagus.

Source: [Nanyang Technological University](#)

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