

BY SANDHYA SRIRAM ON AUGUST 23, 2015 • (LEAVE A COMMENT)

Adhesive Hardens with Low-Voltage, could Mend Surgical Challenges

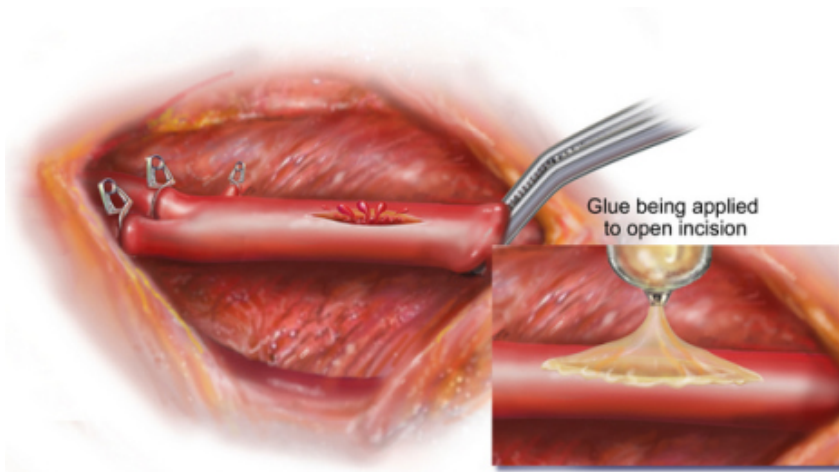


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Scientists from Nanyang Technological University (NTU), Singapore have invented a new adhesive which hardens when low voltage is applied to it.

The new adhesive, nicknamed “Voltaglue”, opens up a host of

practical never-before-possible applications, from making underwater repair works for ships and oil rigs easier, to being a versatile tool for doctors performing surgery. In the future, surgeons could use biocompatible glue patches to join two pieces of internal body tissue together in one or two minutes, instead of sutures which often take 15 to 20 minutes to sew.

This innovative research was published this week in *Nature Communication*

(<http://www.nature.com/ncomms/2015/150818/ncomms9050/full/ncomms9050.html>);

Assistant Professor Terry Steele, the lead scientist for this project from NTU's School of Materials Science and

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“Most glue in the market don't work under wet conditions, much like how sticky tapes won't work if the surface is wet, since the adhesive will stick to the water instead of the surface,” Prof Steele said. “We had to find a way to make glue which cures (hardens) when we want it without being affected by the environmental conditions, so electricity was the best approach for us. The hardness of our glue can be adjusted through the amount of time we apply a voltage to it, which we call electrocuring.”

This unique electrocuring property allows Voltaglue to be customized for different applications.

“For example, if we are gluing metal panels underwater, we want it hard enough to stick for a long time. However, for medical applications, we want the glue to be more rubber-like so it wouldn't cause any damage to the surrounding soft tissues,” Prof Steele explained.

Voltaglue is developed using hydrogels consisting of carbon

molecules called carbenes grafted onto tree-shaped plastic known as dendrimers. Upon contact with electricity, the reactive carbenes, which are capable of hooking onto any surface nearby, are released. The amount of “hooks” created depends on how long electricity is applied and how many carbenes are present.

Another distinct feature of the new glue is that it could be made reversible, said Prof Steele, who clinched almost a million dollars’ worth of competitive research funding from the Singapore Ministry of Education earlier this month.

Moving forward, Prof Steele and his team of 11 researchers are working to improve their new electrocuring glue so it can harden in just a few seconds, compared to about 30 seconds now; and also working on a way to undo the process.

They will also look for the best way to commercialize the technology through a new start-up or via industry partnerships. This technology is currently patented through [NTUitive](http://www.ntuitive.sg/) (<http://www.ntuitive.sg/>), the university’s commercialization arm.

Source: [MDT](http://www.mdtmag.com/news/2015/08/glue-hardens-voltage-could-mend-surgical-challenges?et_cid=4755634) (http://www.mdtmag.com/news/2015/08/glue-hardens-voltage-could-mend-surgical-challenges?et_cid=4755634).