

Octopus inspired adhesive patch works under water

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Octopus vulgaris. Image: Wikipedia.

(Phys.org)—A team of researchers at Sungkyunkwan University in South Korea has developed a type of adhesive patch that works under a variety of conditions including underwater. In their paper published in the journal *Nature*, the team describes how they studied octopus suction cups to design a better patch for human applications.

In their search to create a better adhesive [patch](#), the researchers looked to suction cups used by octopuses to grip objects and prey. They mimicked the suction cups by creating polymer sheets with cup-like dimples with soft spheres in the middle of each. They then tested differently sized dimples and spheres and found that 50 micrometer dimples offered the best grip, which, as it turned out, was the one closest

to that used by an [octopus](#) in its underwater world. To better understand how the suction cups worked, the researchers studied their own creations under a microscope and discovered the secret to the octopus grip is water getting trapped beneath the [sphere](#) near the back edges of the cup—it creates a vacuum chamber when pressure is released.

In testing the patches, the researchers found them able to attach and detach up to 1000 times without the need for replenishment—and without the need for adhesive materials. This, the team notes, makes them a much better option for skin patches as anyone who has used an adhesive patch can attest. Removing sticky patches can be painful, particularly if they have been used to cover a wound. The researchers report also that the patch could adhere to many surfaces, both flat and curved, including skin. And of course, it stuck just as well when the skin was wet. Perhaps most interesting was the fact that the vacuum also allowed the suction cup to work underwater.

The patches the group made were simple rectangular sheets of dimpled plastic with tiny spheres in the middle of each, anchored to the sheet. The patches adhered when pressure was applied. Of course, for the patch to be used in medical or industrial applications a means for releasing the pressure created by the vacuum must be found, perhaps one based on the way an octopus releases its grip.

More information: Sangyul Baik et al. A wet-tolerant adhesive patch inspired by protuberances in suction cups of octopi, *Nature* (2017). [DOI: 10.1038/nature22382](https://doi.org/10.1038/nature22382)

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