

Watching octopus leads scientists to create special hot/cold sheet

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Image 1. A common octopus on the seabed. Photo by: Albert Kok/Wikimedia Commons

Engineer Alon Gorodetsky remembers when he started studying cephalopods. This class of sea animals includes squid, cuttlefish and octopuses. He saw an amazing video. It showed an octopus suddenly appearing out of nowhere from a rock. The animal had a great way of using camouflage, meaning it could hide well. That "made me think, I have to work on this," he said.

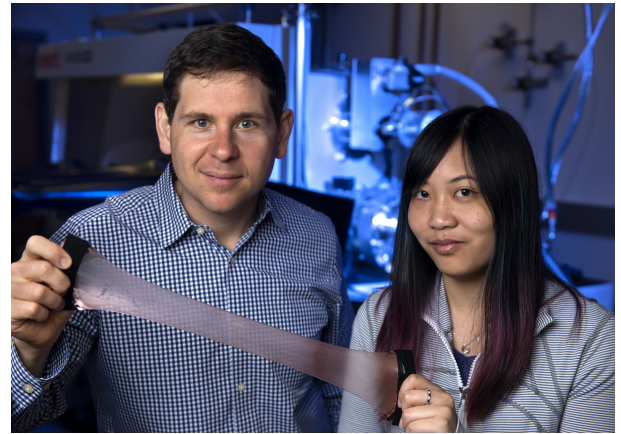
Sheet To Control Body Temperature

Gorodetsky works at the University of California at Irvine (UCI). With the help of cephalopods, Gorodetsky and his team created something — but it's not tied to camouflage. It allows people to control how warm or cool they feel. The UCI team built this material using biomimicry. That is watching how a living thing behaves and then imitating it.

Cells are the tiny building blocks for all life. Cephalopods have skin that's packed with special cells. Those cells contain natural coloring, or pigment. When you can't see the cephalopod, those special

cells are always swelling up and shrinking. Think about drawing dots on a piece of plastic wrap, says Gorodetsky. Then stretch the plastic so that those dots get much bigger.

In the case of the cephalopod, that action changes how light bounces off its skin. This lets it change how it looks. The UCI team used that same idea for their invention. They laid little pieces of copper tightly together on top of a rubber sheet. When the sheet is relaxed, the copper takes in and holds heat. When the sheet is stretched, the copper pieces are pulled apart so that spaces appear. Heat then escapes from those spaces.



People Experience Hot And Cold Differently

It's a simple idea. People could use this material to change their own temperature rather than the temperature of a room they're in. Gorodetsky says this could help buildings save money and energy on heating and cooling. He points out that no two people experience hot and cold the same. His team showed this with an experiment.

"We made sleeves from the material and had three people wear them," he says. "One person's arm started sweating uncontrollably." So they simply stretched the sleeve to feel relief. "One person was fine. A third person felt cold" and could put on an extra sweater rather than turning up the heat.

In the 1960s, NASA made a metal-coated space blanket for astronauts. NASA is the U.S. space agency. This also gave the team ideas for the new material. There is a difference, though. The NASA blanket only helped cold people warm up. UCI's material can help someone who is hot or cold. It can be stretched thousands of times and still work.

Putting The Material Into Cloth

Next, the UCI team has to put the material into cloth. Then the cloth can be used to make things like shirts, sheets and tents.

"There's a world of applications for this material," Gorodetsky says. "We just have to convince people to wear it and use it."

Quiz

- 1 Read the section "Sheet To Control Body Temperature."
- Which selection explains how cephalopods are able to camouflage?
- (A) With the help of cephalopods, Gorodetsky and his team created something — but it's not tied to camouflage.
 - (B) It allows people to control how warm or cool they feel. The UCI team built this material using biomimicry.
 - (C) In the case of the cephalopod, that action changes how light bounces off its skin. This lets it change how it looks.
 - (D) They laid little pieces of copper tightly together on top of a rubber sheet. When the sheet is relaxed, the copper takes in and holds heat.
- 2 Which detail supports the conclusion that the rubber sheet could be very useful in the future?
- (A) People could use this material to change their own temperature rather than the temperature of a room they're in. Gorodetsky says this could help buildings save money and energy on heating and cooling.
 - (B) He points out that no two people experience hot and cold the same. His team showed this with an experiment.
 - (C) "We made sleeves from the material and had three people wear them," he says. "One person's arm started sweating uncontrollably."
 - (D) In the 1960s, NASA made a metal-coated space blanket for astronauts. NASA is the U.S. space agency. This also gave the team ideas for the new material.
- 3 How does the special rubber sheet help something to cool down?
- (A) When it is stretched, it creates spaces that let heat escape.
 - (B) When it is stretched, it closes up its spaces and lets the cold in.
 - (C) When it is relaxed, it creates spaces that let heat escape.
 - (D) When it is relaxed, it closes up its spaces and lets the cold in.
- 4 How did Alon Gorodetsky become involved with making a hot/cold sheet?
- (A) He got the idea from studying cephalopods and how they change temperature.
 - (B) He got the idea from studying cephalopods and how their cells work.
 - (C) He got the idea while he was in a lab at UCI and started playing with rubber.
 - (D) He got the idea while he was in a lab at UCI and started playing with plastic.