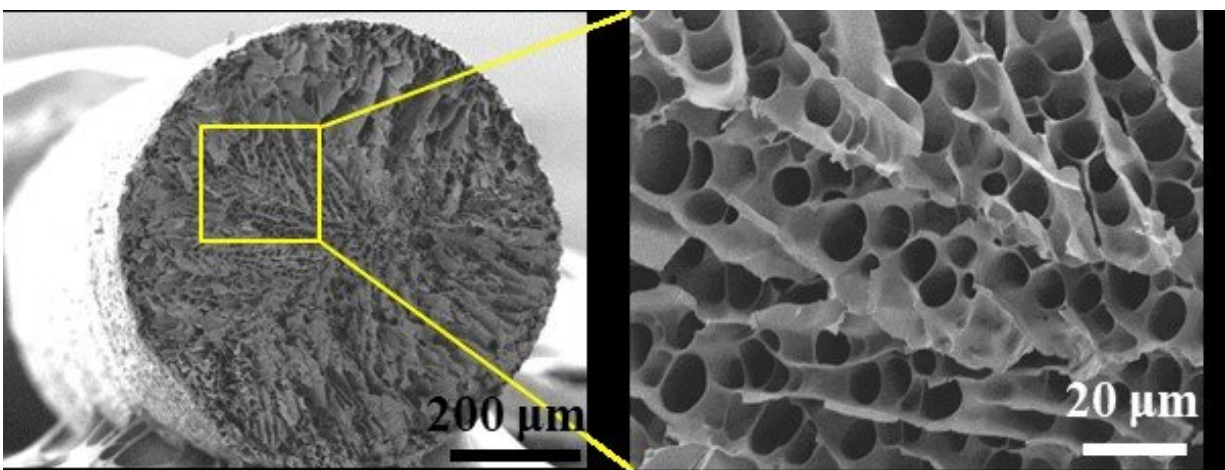


# New textile could keep you cool in the heat, warm in the cold

April 15 2020

---



A microstructured fiber (left) contains pores (right) that can be filled with a phase-changing material that absorbs and releases thermal energy. Credit: *ACS Applied Materials & Interfaces* 2020, DOI: 10.1021/acsami.0c02300

Imagine a single garment that could adapt to changing weather conditions, keeping its wearer cool in the heat of midday but warm when an evening storm blows in. In addition to wearing it outdoors, such clothing could also be worn indoors, drastically reducing the need for air conditioning or heat. Now, researchers reporting in *ACS Applied Materials & Interfaces* have made a strong, comfortable fabric that heats and cools skin, with no energy input.

"Smart textiles" that can warm or cool the wearer are nothing new, but typically, the same fabric cannot perform both functions. These textiles have other drawbacks, as well—they can be bulky, heavy, fragile and expensive. Many need an external power source. Guangming Tao and colleagues wanted to develop a more practical textile for personal thermal management that could overcome all of these limitations.

The researchers freeze-spun silk and chitosan, a material from the hard outer skeleton of shellfish, into colored fibers with porous microstructures. They filled the pores with [polyethylene glycol](#) (PEG), a phase-changing polymer that absorbs and releases thermal energy. Then, they coated the threads with polydimethylsiloxane to keep the liquid PEG from leaking out. The resulting fibers were strong, flexible and water-repellent. To test the fibers, the researchers wove them into a patch of fabric that they put into a polyester glove. When a person wearing the glove placed their hand in a hot chamber (122°F), the solid PEG absorbed heat from the environment, melting into a liquid and cooling the skin under the patch. Then, when the gloved hand moved to a cold (50°F) chamber, the PEG solidified, releasing [heat](#) and warming the skin. The process for making the fabric is compatible with the existing textile industry and could be scaled up for [mass production](#), the researchers say.

**More information:** Jiawei Wu et al, Flexible and Robust Biomaterial Microstructured Colored Textiles for Personal Thermoregulation, *ACS Applied Materials & Interfaces* (2020). [DOI: 10.1021/acsami.0c02300](https://doi.org/10.1021/acsami.0c02300)

Provided by American Chemical Society

Citation: New textile could keep you cool in the heat, warm in the cold (2020, April 15) retrieved 3 May 2024 from <https://phys.org/news/2020-04-textile-cool-cold.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.