Self-cooling tent runs using just water and sunshine

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Credit: University of Connecticut

For many avid outdoorspeople, summertime and camping go hand in hand. But as climate change continues to drive summer temperatures higher, outdoor recreation could become less relaxing—and cooling

technologies like fans and portable air conditioners require electricity that is seldom available at the average campsite.

Seeing an unmet need, UConn researcher Al Kasani, working with Technology Commercialization Services (TCS) and the university's Center for Clean Energy Engineering (C2E2), has developed a new off-grid technology that allows a tent's internal temperature to cool up to 20°F below the ambient temperature.

The tent requires just one external element to function, one that is typically found in abundance around campsites: water. A single gallon of water can power the tent's cooling technology for up to 24 hours.

"Looking into nature is the key to many of our problems. Plants wick water from the ground and then sweat to cool themselves, and they get the required energy from the sun. What I did was simply to find a material that could do the same job," Kasani says.

A proprietary fabric wicks water from a reservoir up through the entire surface area of the tent, leading to an electricity-free temperature decrease far more substantial than existing cooling technologies. The most efficient technology currently on the market, explains Michael Invernale, a senior licensing manager at TCS, is an infrared reflective tent.

"All the heat gets bounced off of an infrared reflective tent, and the best-case scenario there is that it's just as hot in the tent as it is outside," he says. "It's not any hotter, but depending on what's inside the tent versus outside, and air flow, it might still feel hotter inside the tent, even if the temperature is the same. With this new evaporative cooling technology, you can get the inside temperature down to 15 or 20 degrees cooler inside versus outside."

The tent has a tiny footprint, both physically and ecologically. Its lightweight fabric makes it packable and far more portable than electric fans, and its cooling system is "powered" by endlessly repeatable reactions between water and titanium nanoparticles—eliminating emissions and utilizing renewable resources. The wide availability of titanium ensures that the tent's production will remain cost-effective for producers and affordable for consumers.

The moisture-wicking technology also has an added benefit: an air-purifying effect provided by the antimicrobial nanoparticles.

"The water and the nanoparticles are undergoing a reversible reaction, over and over as the water leaves. But the water is getting in contact with this catalytic material, and the process of that generates radicals and it will kill [infectious] material that's in and on the tent. So, it could also be considered a bit of an air cleaner," Invernale says.

Industry interest in Kasani's technology has been high, according to Invernale, whose office assists researchers in commercializing their innovations into products that benefit society and fuel economic development. Eventually, he hopes to see the tent on the market for recreational campers, as well as foresters, military personnel, and all who could benefit from a cooler place to take shelter.

More information: Tent information: uconn.flintbox.com/technologie… 1e-8707-18e35656301b

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