Researchers find slime mold feeding fronds have memristance

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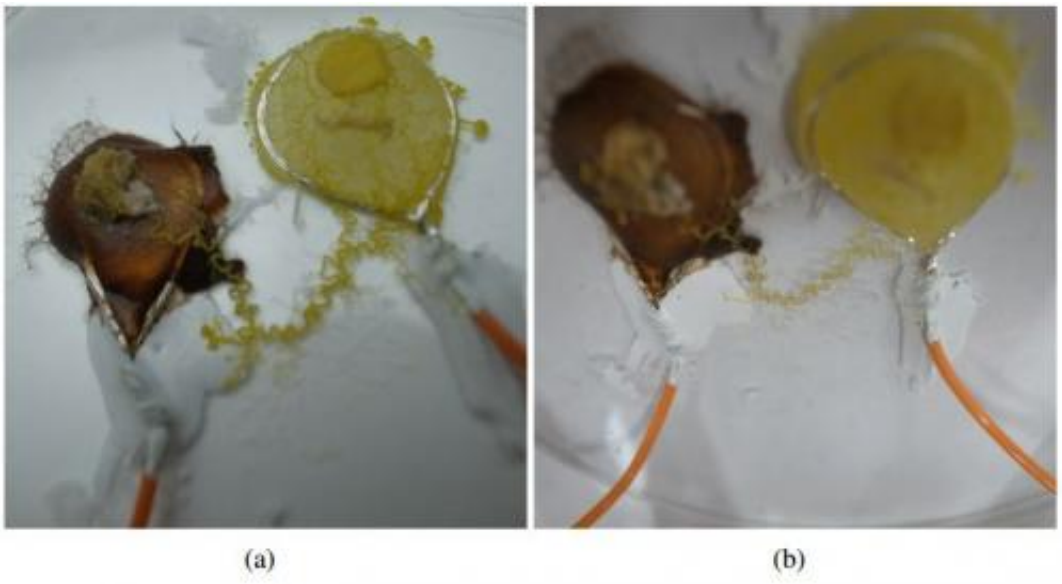

An example from on the experiment inoculated with nanoparticles. After measurements, the tube has thinned, unnecessary parts have been 'burnt off', colour is a lighter hue. Credit: arXiv:1306.3414 [cs.ET]

(Phys.org) —Researchers at the University of the West of England have found that the feeding fronds on a type of slime mold have a property known memory resistance, which has been shortened to the term memristance. In their paper uploaded to the preprint server *arXiv*, the team describes how experiments on the slime mold *P. polycephalum* demonstrated the unique property previously only found naturally in human sweat glands, blood and some tree leaves.

Memristance, first described by Leon Chua back in 1971, is where a material has the unique property of undergoing a change in electrical resistance as current is applied. When applied in one direction, resistance increases; when applied in the other, it decreases. More importantly perhaps, such materials also have the remarkable ability to "remember" how much resistance was being applied when the power was turned off. When electricity is restored, the material has the same resistance it had at its prior stopping point. For that reason, researchers have been interested in finding a way to use memristance materials in computers. To date, some progress has been in creating artificial materials with memristance —a team at Hewlett Packard, for example, has been successful in creating a type of switching memristor using titanium dioxide.

To better understand how memristance materials work, researchers have turned to nature for examples. In this new effort, the researchers applied voltage to feeding frond samples of the slime mold and found that it conformed to the criteria that describe a memristance material. The finding, they suggest, should help in the development of bio-electronic circuits that can be grown rather than created from other materials.

The team's work builds on prior studies that have shown slime molds capable of finding the shortest path to a food source, which the researchers note could be useful in computer algorithms that seek to perform similar tasks. They acknowledge that it isn't likely that slime molds will one day sit at the heart of future computers systems, of course, but suggest that biological materials similar to that found in molds could one day be used to create computers unlike anything that exists today.

More information: Are Slime Moulds Living Memristors? arXiv:1306.3414 [cs.ET] arxiv.org/abs/1306.3414

Abstract

In laboratory experiments we demonstrate that protoplasmic tubes of acellular slime mould emph{Physarum polycephalum} show current versus voltage profiles consistent with memristive systems. This result complements previous findings on memristive properties of other living systems (human skin and blood and leaves) and contributes to development of self-growing bio-electronic circuits.