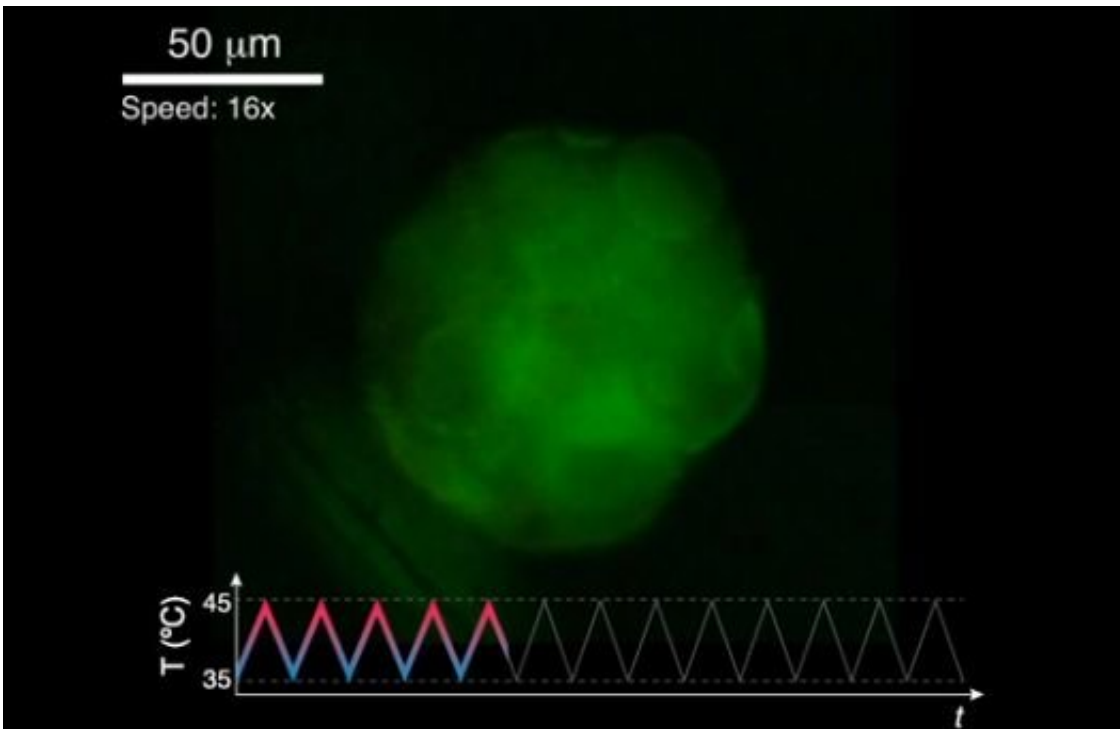


Scientists create synthetic prototissue capable of synchronised beating

October 15 2018



The discovery, published in *Nature Materials*, is the first chemically programmed approach to producing an artificial tissue. The findings, which could have major health applications in the future, could see chemically programmed synthetic tissue being used to support failing living tissues and to cure specific diseases.

The development of synthetic [tissue](#) which can mimic the ability of living [cells](#) to produce functions such as beating and chemical detoxification has, until now, remained a major synthetic biology challenge.

A team, led by Professor Stephen Mann FRS and Dr. Pierangelo Gobbo from Bristol's School of Chemistry, chemically programmed artificial synthetic cells known as protocells to communicate and interact with each other in a highly co-ordinated way.

The researchers constructed two types of artificial cells each having a protein-polymer membrane but with complementary surface anchoring groups. The team then assembled a mixture of the sticky artificial cells into chemically-linked clusters to produce self-supporting artificial tissue spheroids. By using a polymer that could expand or contract as the temperature was changed below or above 37 °C, it was possible to make the artificial tissues undergo sustained beat-like oscillations in size.

The team was able to increase the functionality of the artificial tissues by capturing enzymes within their constituent artificial cells. Using various combinations of enzymes, the team was able to modulate the amplitude of the beating and control the movement of chemical signals in and out of the artificial tissues.

Professor Stephen Mann FRS, Professor of Chemistry at Bristol and lead author, said: "Our approach to the rational design and fabrication of prototissues bridges an important gap in bottom-up synthetic biology and should also contribute to the development of new bioinspired materials that work at the interface between living tissues and their synthetic counterparts."

Dr. Pierangelo Gobbo, lead author, added: "Our methodology opens up a route from the synthetic construction of individual protocells to the co-

assembly and spatial integration of multi-protocellular structures. In this way, we can combine the specialisation of individual protocell types with the collective properties of the ensemble."

More information: Pierangelo Gobbo et al, Programmed assembly of synthetic protocells into thermoresponsive prototissues, *Nature Materials* (2018). [DOI: 10.1038/s41563-018-0183-5](https://doi.org/10.1038/s41563-018-0183-5)

Provided by University of Bristol

Citation: Scientists create synthetic prototissue capable of synchronised beating (2018, October 15) retrieved 28 April 2024 from <https://phys.org/news/2018-10-scientists-synthetic-prototissue-capable-synchronised.html>

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