Making artificial 'cells' move like real cells

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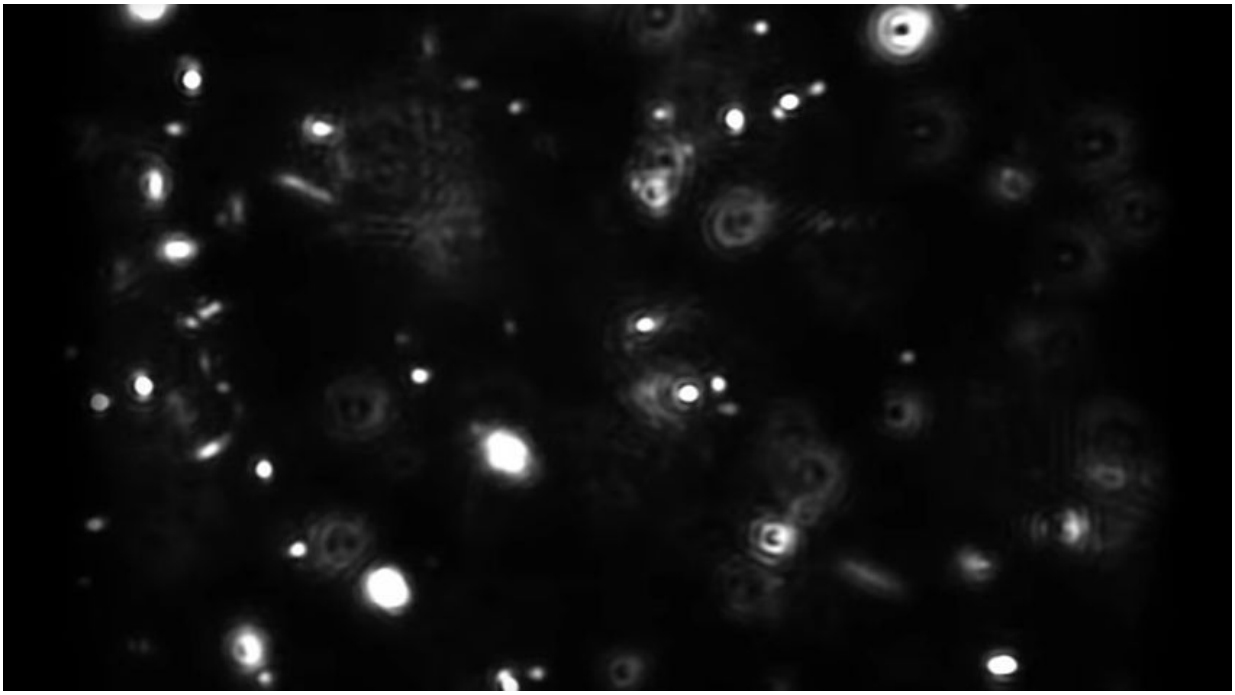

Artificial "cells" could someday zoom around in the body and deliver medicines to specific locations, act as in-tissue diagnosticians and provide viable replacements for whole cells and organs. To do this, they will need to be able to navigate the complex environments of our bodies. Now, in *ACS Central Science*, researchers report development of lab-made cells that use enzymes to move just like real cells.

Just as a hungry person can walk to the cafeteria as quickly as a person who is full, cells also perform their duties when their fuel levels are high and when their fuel levels are low. Wilhelm Huck, Daniela Wilson, Jan van Hest and colleagues proposed that mirroring the ways that cells maintain this state of "homeostasis" in the face of differing conditions could be harnessed to propel non-living nano-objects in analogous changing environments.

Starting with known regulatory networks of enzymes, the researchers used computer modeling to determine how many and how much of each enzyme would be needed to keep an artificial cell moving. Then they constructed artificial cells containing just those components. Just like for people, the ultimate fuel was sugar. And just like for us, the cells could sustain the same speed as their sugar supply ran down. The authors showed that the artificial cells moved in a directed way, but only when they contained all of the enzymes and the fuel was available in the media. The researchers suggest their concept could be applied to many of the other fuel-dependent characteristics of life beyond movement to make additional molecular life-like systems.

More information: "A Compartmentalized Out-of-Equilibrium Enzymatic Reaction Network for Sustained Autonomous Movement" *ACS Central Science*, pubs.acs.org/doi/full/10.1021/acscentsci.6b00254.

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