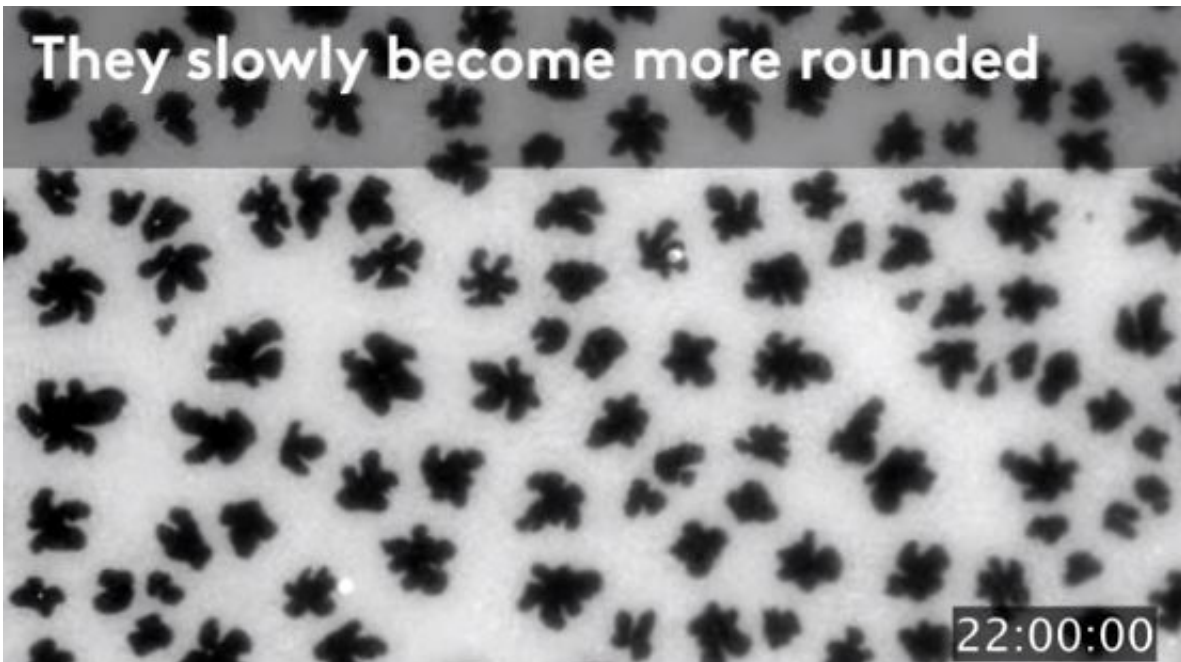


Researchers film beautiful flower formations inside artificial cell membranes

January 11 2016



Every day all over the world, researchers work with artificial cell membranes. Despite the fact that they are so widely used, they still hold secrets. Now University of Southern Denmark researchers reveal how beautiful flower formations bloom and wither inside artificial cell membranes.

Artificial cell membranes are some of the most important tools in

modern bio-science and they provide us with a better understanding of how cells function and thus help us understand diseases, develop drugs, etc.

Also at University of Southern Denmark, researchers work with [artificial cell](#) membranes, and they too perform many experiments on how to make various compounds cross the membrane in order to reach the center of the cell.

"To understand complex systems such as real biological cells it is absolutely crucial that we understand the simpler systems that make up the cell, for example the [cell membrane](#), through studies of model membranes", explains Jonas Camillus Jeppesen, Ph.D. student, University of Southern Denmark.

On that background, he and a group of colleagues set out to investigate if structures in the membrane remain static or change with time while being used for research. The work is reported in the journal *Langmuir*, and Jeppesen is first author.

"We knew that freezing membranes containing two different types of lipids (fat molecules) cause domains of curious flower shapes to form. It is kind of like freezing a 'mixture' of oil and water. When the water freezes at 0 degrees C it forms ice crystals, or domains, in the still liquid oil. We knew these flower shaped domains form, but we did not know if they were stable static structures, or if they would change shape given time", says Jeppesen.

The team decided to take time lapse photos of the process. The time lapse film reveals that it only takes a few minutes for fat molecules to gather in beautiful flower shaped forms, when the temperature drops below the [freezing point](#).

Everything in nature wants to be round

"But it turns out they do not keep these flower shapes indefinitely. After a few days they look quite different. Some leafs have withered away and others grown. Give them a few weeks and they end up almost round", says Jeppesen.

The explanation is that the [fat molecules](#) do as all other elements in nature: They seek the most relaxed state; the state of equilibrium, which is round for domains in a membrane.

"Everything in nature is round. Find a square tree trunk or a square oil droplet on your frying pan and you would be suspicious", explains Jeppesen.

So in that sense it was not surprising for Jonas et al to see that the fat molecule flowers became rounded in their experiment.

"But it was important to find out how long they remain flower shaped. Researchers have assumed the flower shapes to be static, at least for several hours. We have now shown that it is reasonable to assume the flowers are static for hours, but not for days", explains Jeppesen.

More information: Jonas Camillus Jeppesen et al. Slow Relaxation of Shape and Orientational Texture in Membrane Gel Domains, *Langmuir* (2015). [DOI: 10.1021/acs.langmuir.5b03168](https://doi.org/10.1021/acs.langmuir.5b03168)

Provided by University of Southern Denmark

Citation: Researchers film beautiful flower formations inside artificial cell membranes (2016, January 11) retrieved 25 April 2024 from <https://phys.org/news/2016-01-beautiful-formations->

artificial-cell-membranes.html

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