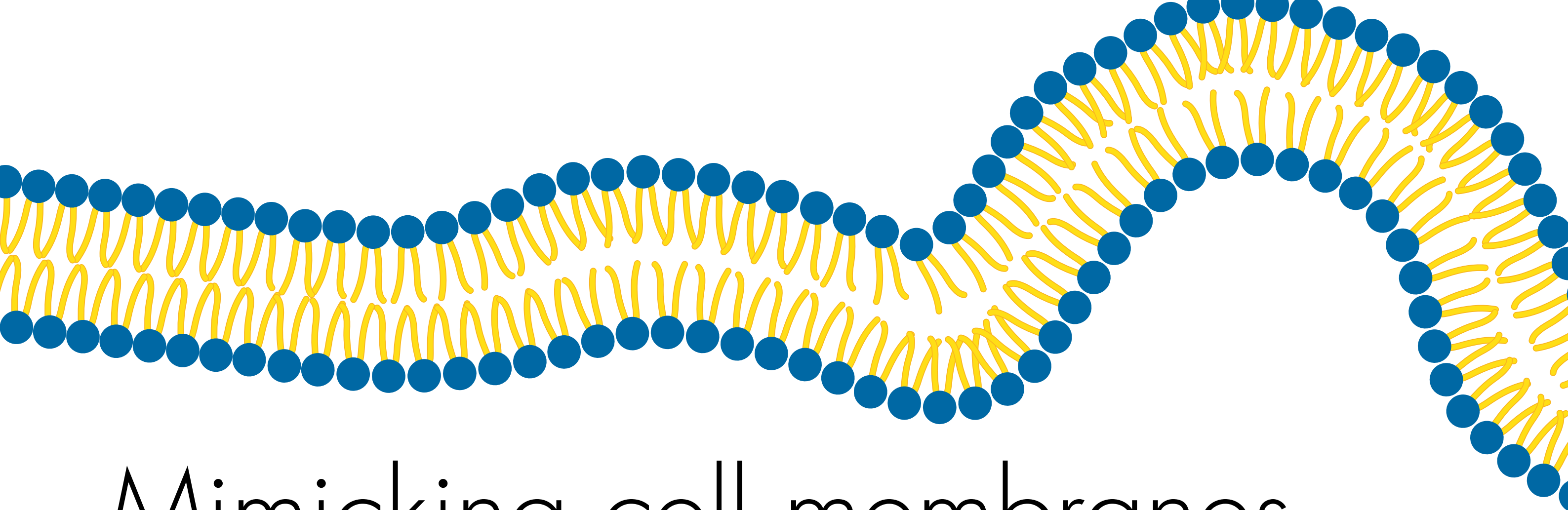


Mimicking cell membranes

A Swinburne University of Technology researcher has taken big steps towards reliably modelling cell membranes. The process could help to improve biosensor technologies and drug delivery techniques.

Cell membranes are the interface between the interior of a human cell and the outside environment. The membrane is made of from an organised lipid molecule structure known as a lipid bilayer.

The membrane plays an important role in transporting molecules in and out of the cell so studying them enables researchers to improve the understanding of drug pathways into human cells.

The problem is conducting research on real cell membranes is challenging as they are complex and variable environments.

Supported lipid bilayers (SLB) can be used to reliably replicate membranes and they can be created by collapsing spherical lipid bilayers onto a support surface. However, reliably collapsing the spheres has proven difficult – the process is complex and the relationship between the surface chemistry of the support material and the lipid spheres is poorly understood.

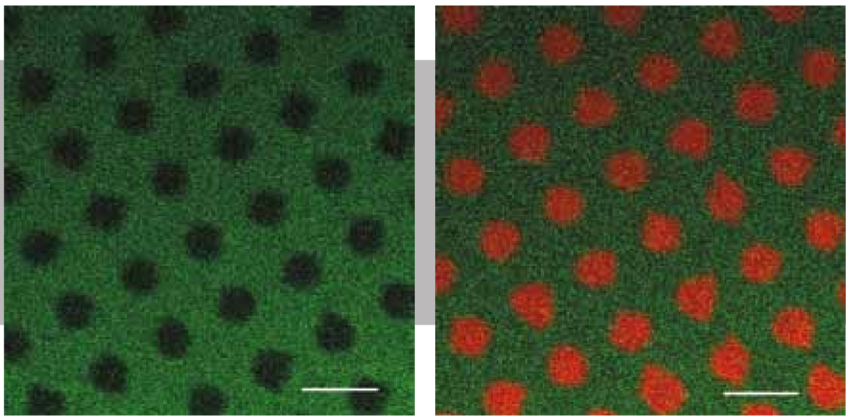
Dr Hannah Askew began investigating how different surface chemistries and acidity or alkalinity could influence the creation of SLBs during her PhD project at Swinburne University of Technology.

Using ANFF VIC's plasma polymerisation capabilities at Swinburne and the node's characterisation equipment at La Trobe University, Hannah applied coatings of acrylic acid (ppAAc), allylamine (ppAAm) and ppAAc/ppAAm patterns to support materials to vary their surface properties. A photolithography mask manufactured at the OptoFab node, enabled the creation of the ppAAc/ppAAm patterns.

Hannah found that the lipid spheres stuck to ppAAm irrespective of pH. However, when coated with ppAAc, pH could be used to control the behaviour of the spheres at the surface. When ppAAm and ppAAc regions were deposited on the same surface in a pattern, a hybrid SLB was produced with both rigid and fluid lipid bilayer regions.

The patterned coating combined with careful use of pH enabled the spatial control of both lipid location and mobility.

This outcome contributes to the development of increasingly complex cell membrane models which can be used in a variety of industries to investigate processes such as drug-membrane interactions and to develop improved biosensing platforms.



• *Confocal microscopy image of a patterned surface of ppAAc circles (stained red) on ppAA (stained green). Scale bar = 20μm. Credit: Hannah Askew*