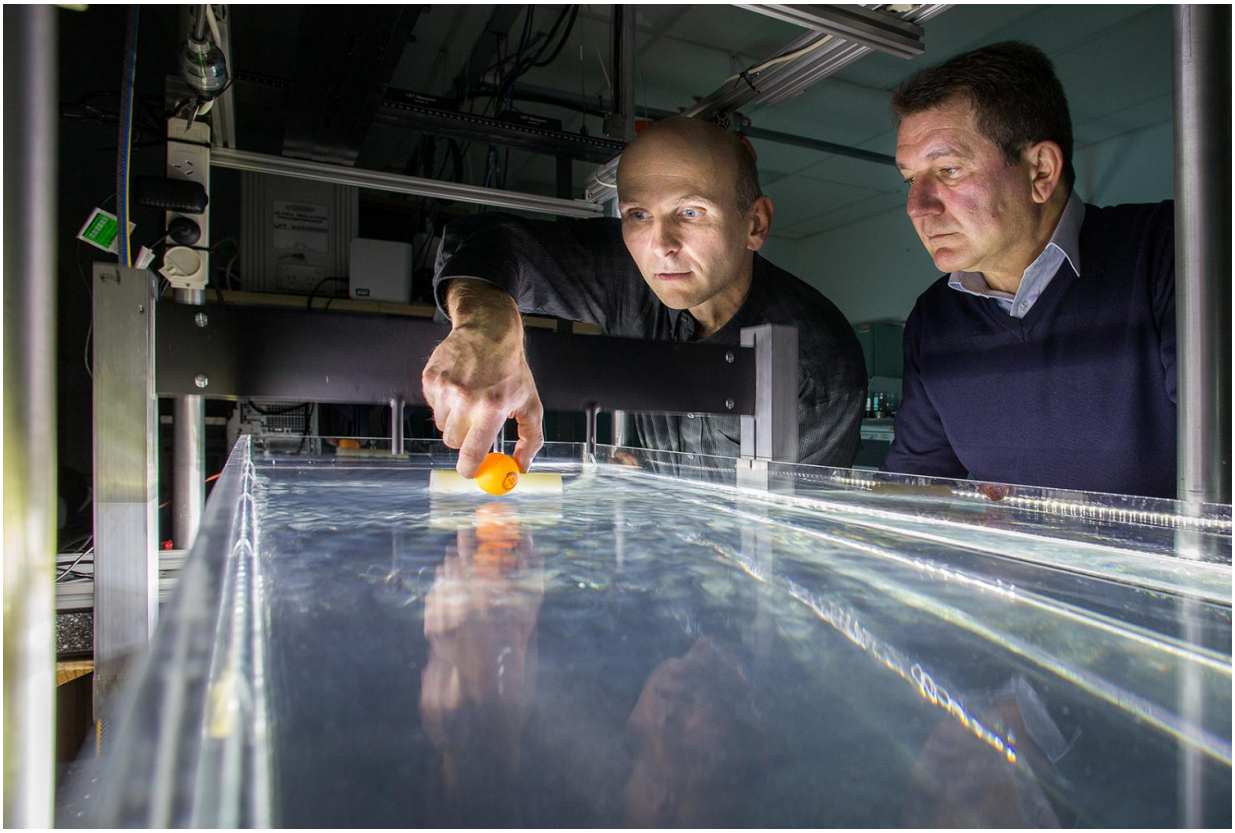
Scientists make new high-tech liquid materials

February 9 2017



Dr Horst Punzmann (left) and Professor Michael Shats in the lab. Credit: Stuart Hay, ANU

Scientists at The Australian National University (ANU) have controlled wave-generated currents to make previously unimaginable liquid

materials for new technological innovations, including techniques to manipulate micro-organisms.

The new kind of dynamic material could be revolutionary, similar to other materials created in recent decades that have been used for invisibility cloaking, superlenses and high-efficiency antennae.

Research group leader Professor Michael Shats from ANU said the currents made a liquid behave like materials with regular structures such as crystals.

"It's an incredibly powerful new tool that will work at the surface of almost any liquid," said Professor Shats from the ANU Research School of Physics and Engineering.

"By changing waves, we can change the flow patterns. This allows us to remote-control the nature of the material."

The flow patterns can be changed at will, so the liquid-based materials are more dynamic and flexible than solid materials.

"These flow patterns are effectively two-dimensional materials at the interface between the liquid and the gas above it," Professor Shats said.

The research is published in *Nature Communications*.

Lead author Dr Nicolas Francois from the ANU Research School of Physics and Engineering said each current was like a Lego brick.

"Now we have created the brick, people will be able to make complex structures we cannot imagine now," he said.

"If you use conducting liquids you can create an interface with designed

electrical properties. Or with biocompatible substances you can guide micro-organisms or trap them."

The team observed the flow patterns in a tank of water by generating a wave pattern with two oscillators and tracking fluid particles. They also modelled the flow with computer simulations and theoretical calculations.

More information: N Francois et al, Wave-based liquid-interface metamaterials, *Nature Communications* (2017). DOI: 10.1038/NCOMMS14325

Provided by Australian National University