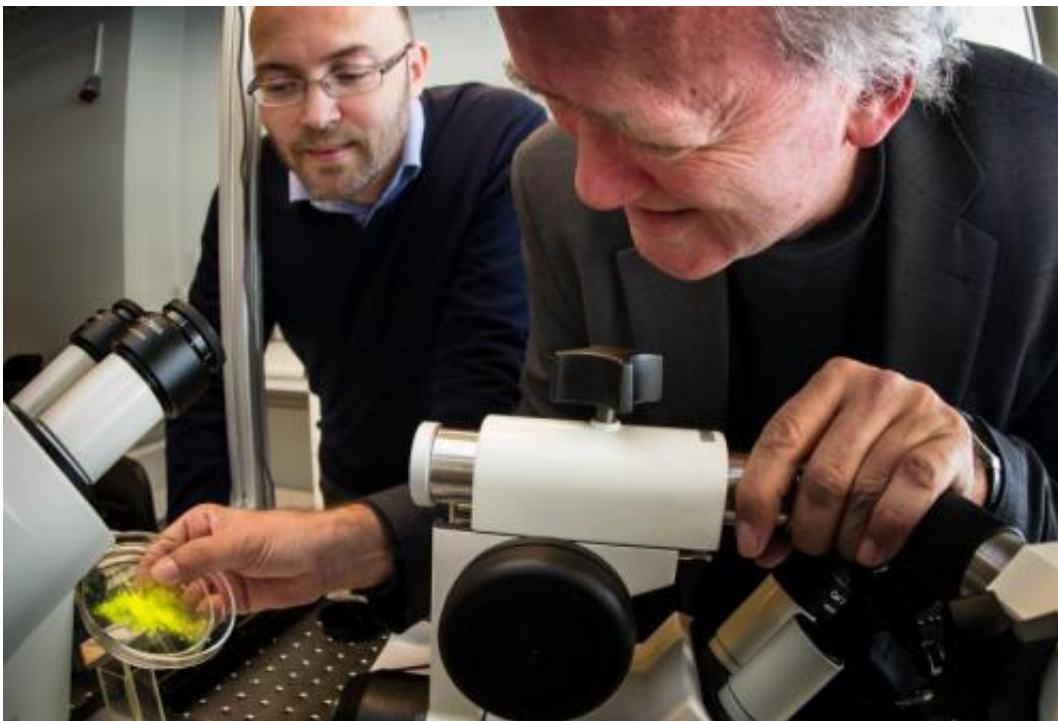


Breakthrough method for making Janus or patchy capsules

May 23 2014



Paul Dommersnes, left, from the University of Paris, Diderot, and Jon Otto Fossum, from the Norwegian University of Science and Technology, were among the team that has come up with a novel way to create patchy capsules. Credit: Per Harold Olsen

Hollow capsules that have a selectively permeable shell are promising candidates as tiny containers for molecules, particles or bubbles, and are becoming increasingly important in a wide variety of applications. But

making these kinds of capsules with more than one kind of substance on their shells has been challenging – until now.

In a article in the latest edition of *Nature Communications*, NTNU researcher Jon Otto Fossum and Paul Dommersnes from the University of Paris, Diderot, were part of a team that showed that both Janus and more advanced patchy capsules can be assembled by combining electro-coalescence and electro-hydrodynamic flow in leaky dielectric emulsion drops. This technique can be used with any type of insulating or weakly conductive particles.

Their work is the realization of one possible direction foreseen by the same researchers in a publication in *Nature Communications* in 2013.

Hollow capsules with two or more [substances](#) on their surface are able to organize themselves in specific ways, which means they could be used to grow human skin or other body tissues, or to make porous tissues and composites. They can also be used to transport a variety of substances and release them in specific environments.

Janus capsules, named for the two-faced Roman god, have just two different substances in their shells. They are a sub-group of patchy capsules, which can have more than two different substances in their shells. The researchers were able to make both Janus capsules, with two different substances, and patchy capsules, which had stripes or flecks on them.

Janus and patchy capsules are distinct from Janus and patchy particles, which are solid. These capsules combine the characteristics of Janus or patchy particles, and those of capsules such as colloidosomes.

The different characteristics on the shells of the capsules make them attractive to each other in different ways, depending on the composition

of the capsule [shells](#), which means they can create scaffolds suitable for biomedical applications, for assembling electric circuits or optical structures such as photonic crystals, and as vehicles for liquid or molecular transport.

The researchers foresee that their route for designing patchy capsules will facilitate the foundation for many advanced applications, for example, by using microfluidic methods.

More information: "Electroformation of Janus and patchy capsules", *Nature Communications* 5:3945 (2014), [DOI: 10.1038/ncomms4945](https://doi.org/10.1038/ncomms4945)

Provided by Norwegian University of Science and Technology

Citation: Breakthrough method for making Janus or patchy capsules (2014, May 23) retrieved 24 April 2024 from

<https://phys.org/news/2014-05-breakthrough-method-janus-patchy-capsules.html>

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