## Plumes of ocean spray emanating from Jupiter's moon Europa

New research offers additional evidence of plumes emanating from

The research ories auditional evidence of plunies entailating from Europa's subsurface ocean. Images captured by the Hubble Telescope have previously sug-gested the presence of ocean plumes ejected through tissues in the icy crust of Jupiter's moon. Some astronomers were skeptical of the Hubble results, however, UPI wrote.



are ejected through tissues icy surface

The newest proof was discovered among discovered among data collected by the Galileo mission in 1997 during a Europa flyby. Scientists detailed the new proof in a paper published in the journal Nature Astronomy.

Scientists with the Cassini mission were able to identify water plumes protruding from Saturn's moon Enceladus by measuring per-

turbations in the magnetic fields surrounding the satellite Molecules and atoms ejected in a watery plume quickly become

Molecules and atoms ejected in a watery plume quickly become ionized as solar winds knock out electrons.

When the plume's particles become electrically conductive, they alter the surrounding magnetic fields. These changes in the magnetic fields can be identified and linked with the presence of plumes.

After identifying Enceladus' plumes, Cassini was able to sample

the vapors and detect its chemical composition, confirming their pres ence. Gravity maps confirmed the plumes originated from the moon's

ence. cravity maps continued the plumes originated from the moon sourface. Based on data collected by the Cassini mission, scientists designed a model to predict the size and behavior of Europa's plumes. Then, scientists examined the Galileo flyby data for the magnetic field signatures predicted by their model.

Study author Andrew Coates, an astrophysicist at the University College London, wrote, "The results — based on an observed deflection and decrease in the observed magnetic field over a distance of 1000km — imply that there's a dense perior of charged particles.

tion and decrease in the observed magnetic field over a distance of 1,000km — imply that there's a dense region of charged particles.

"This is very likely to be the result of a plume, making it the best direct evidence for such an occurrence yet."

Scientists have previously identified Europa as a prime target in the search for extraterrestrial life, suggesting the moon's ocean enable betweenpartities of sirrebus. could host communities of microbes.

could host communities of microbes.

Until now, scientists thought a probe would need to land on the icy moon to investigate, but the latest research suggested the plumes could be sampled by an orbiter.

Both NASA and the European Space Agency (ESA) have missions to Jupiter and Europa planned.

ESA's JUICE mission, set to launch in 2022 and deliver a probe to Jupiter by 2020 here, by Europe Bubber allowed.

Lo Jupiter by 2030, has two Europa flybys planned.

NASA's Europa Clipper, scheduled to launch between 2022 and 2025, will execute a few dozen Europa flybys.

## Scientists use mini tractor beam to build tissue out of artificial cells

▼ cientists have constructed unique tissue-like structures using artificial cells and a tractor beam. The technology could eventually be used to create complex networks of artificial

Researchers at Imperial College Researchers at Imperial College London (ICL) and Loughborough Uni-versity were able to alter the artificial cell membranes to promote connectiv-ity, causing cells to stick together like 'stickle bricks', UPI reported. ICL chemist Yuval Elani said, "Ar-

tificial cell membranes usually bounce off each other like rubber balls.

"By altering the biophysics of the membranes in our cells, we got them instead to stick to each other like stick-

Researchers used a miniature tractor beam, or 'optical tweezers', to drag and drop the artificial cells into positions, causing them to adhere to each other and form unique struc-

tures.

The structures could then be moved as an entire unit and combined without structures.

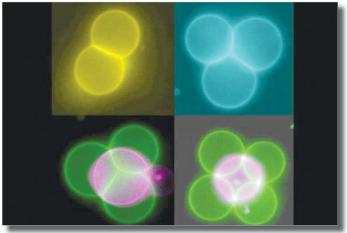
Scientists were able to build simple

Scientists were able to build simple cell networks capable of approximating biological functions.

Elani said, "By reinserting biological components such as proteins in the membrane, we could get the cells to communicate and exchange material with one another.

This mimics what is seen in nature so it's a great step forward in creating biological-like artificial cell tissues." Researchers also engineered a less

rigid connection mechanism, a tether that links two cells without directly connecting them.



Researchers used 'optical tweezers' — a mini laser-powered tractor beam, to move and arrange cells into complex struc

The two connection mechanisms lowed scientists to build 2D and 3D structures, including long chains of cells and pyramid-like shapes.

The team of biochemists were also able to connect two cells and merge them into one.

Scientists coated the membranes of the cells with gold nanoparticles and then blasted their junction with the op-tical tweezer's laser beam.

When the nanoparticles vibrated, the

membrane broke down and then two cells fused together. Scientists could potentially use the

fusion technique to trigger intercell chemical reactions.

When the two cells fuse and reform. their insides mix. The technology could be used to deliver drugs or alter a cell's primary function.

The new cell architecture and cell

manipulation techniques were de-tailed Monday in the journal Nature

Communications.

ICL chemist Oscar Ces said, "Connecting artificial cells together is a valuable technology in the wider toolkit we are assembling for creating these biological systems using bottom-up

biological systems using bottom-up approaches.

"We can now start to scale up basic cell technologies into larger tissue-scale networks, with precise control over the kind of architecture we cre-

## UK ups ante on Galileo sat-nav project

The Brexit row between the UK

Britain's space agency has written to 13 firms to remind them that they need security authorization to engage in any future contracts on the sat-nav system, according to

It is being interpreted as a threat to block UK tech developed for

also made it clear that British com panies will not be allowed to work on PRS after Brexit.

London's dismay at being shut cont of a system it helped develop has been to raise the prospect of withdrawing from Galileo com-pletely, and to consider starting up its own indigenous sat-nav net-

work. Such a move could slow the de



The Galileo system was conceived to give Europe an independent

Galileo from being transferred into

the EU-27.
The European Commission said
Brexit means the UK will have to be excluded from a key element of the system after March next year.

the system after March next year.
This is the Public Regulated Service, or PRS — a navigation and
timing signal intended for use by
government agencies, armed forces
and 'blue light' services.
The PRS is designed to be avail-

able and robust even in times of cri-

Brussels said London cannot im-Brussels said London cannot im-mediately have access to it when the UK leaves the European bloc because it will become a foreign entity. PRS is for EU member states

only.

The European Commission has

velopment of Galileo which is not yet complete — and increase its

Monday's letter is a further shot across the bows. By reminding British companies that they need the express security clearance from ministers to engage in new contracts, London is essentially saying to Brussels that it has the power to ston those companies from handing. stop those companies from hand over technical knowledge on PRS to firms in the EU-27. Such transfers would be done under contract.

A UK Space Agency spokesman said, "We have written to all UK companies currently authorized to work on the secure elements of Galileo, asking them to consult us before taking on future contracts relating to the design and development of the program and its encrypted

service.

"This is a necessary consequence of the European Commission's position to exclude UK industry from the project on the suggestion of security concerns, which the UK security concerns, which the Government strongly disagr

with.
"The UK Space Agency is leading the work to develop options for a British alternative to Galileo, to guarantee our satellite positioning navigation and timing needs are

navigation and timing needs are met in the future."

The EU's chief Brexit negotiator, Michel Barnier, reiterated the bloc's view that the UK was locking itself out of Galileo PRS by walking out of the EU.

He said, "Third countries and their companies cannot participate in the development of security-sen-

sitive matters.

"These rules will not prevent the UK as a third country from using the encrypted signal of Galileo pro viding that the relevant agreen en the EU and the UK are in

Merely having access to PRS at some future date (as has been re-quested by other nations outside the EU, Norway and the US) will not

be good enough for London.

It wants British companies to continue to participate in all aspects of the development and build of Galileo.

Major contributions have been Major contributions have been made by: Surrey Satellie Technology Limited (SSTL), which has prepared the navigation payloads on every operational satellite in the sky; the UK arm of Airbus, which controls the satellites at its center in Portsmouth: And CGI (formerly Logica), which has been instrumental in designing PDS: itself. been instr PRS itself.

It's the size of a grain of rice but could hold the key to

many aspects of your life. many aspects of your life.

A tiny microchip inserted under the skin can replace the need to carry keys, credit cards and train tickets, according to dailysabah.com.

That might sound like and company problemers to some

Orwellian nightmare to some but in Sweden it is a welcome reality for a growing number who favors convenience over concerns of potential personal data violations.

The small implants were first used in 2015 in Sweden initially confidentially and several other countries

Swedes have gone on to be very active in microchipping, with scant debate about issues surrounding its use, in a country keen on new technology and where the sharing of per-sonal information is held up as

The 28-year-old Ulrika
Celsing is one of 3,000
Swedes to have injected a microchip into her hand to try out a new way of life.

To enter her workplace, the To enter her workplace, the media agency Mindshare, she simply waves her hand on a small box and types in a code before the doors open. She said, "It was fun to try

something new and to see what one could use it for to make life easier in the future

"In the past year, the chip has turned into a kind of elec-tronic handbag and has even replaced her gym card." If she wanted to, she could

also use it to book train tickets. Sweden's SJ national railway company has won over some 130 users to its micro-chip reservation service in a

Conductors scan passengers' hands after they book

them on their chip. Sweden has a track record Sweden has a track record on the sharing of personal in-formation, which may have helped ease the microchip's acceptance among the Nordic country's 10 million-strong cannot read information them-

Although still small, they have the capacity to hold train tickets, entry pass codes as well as access certain vending machines and printers, pro-moters said

## Microchips get under skin of technophile Swedes



dailysabah.com

population.

population.

Citizens have long accepted the sharing of their personal details, registered by the social security system, with other administrative bodies, while people can find out each other's' salaries through a quick phone call to the tax authority

authority.

The implants use Near Field
Communication (NFC) technology, also used in credit
cards, and are 'passive', which
means they hold data that can
be read by other devices but

When Celsing's innovatively minded media com-pany organized an event where employees could get the implants, she followed the

She said she felt nothing but a slight sting when the syringe inserted the chip into her left hand, which she now uses on an almost daily basis and does not fear hacking or possible surveillance.
"I don't think our current

technology is enough to get chip hacked. But I may think

about this again in the future. I

could always take it out then." However, for Ben Libber-However, for Ben Libber-ton, a microbiologist working for MAX IV Laboratory in the southern city of Lund which provides X-rays for research, the danger is real.

He warned, "The chip im-plants could cause infections

plants could cause infections or reactions of the immune system. But the biggest risk was around the data contained in the chip."

The researcher said, "At the moment, the data collect-

ed and shared by implants is small, but it's likely that this will increase."

The real question, he added, is what data is collected and who shares it.

Libberton said, "If a chip can one day detect a medical

problem, who finds out and

He worried that the more data is stored in a single place as could happen with a chip, the more risk it could be used against us.

But Jowan Osterlund, a piercings specialist and self-proclaimed champion of chip implantation, brushed off fears of data misuse and con-

spiracy theories. He advocated the opposite view, arguing that if ried all our personal data on us, we would have better con-

us, we would have better con-trol of their use.

Despite unanswered ques-tions however about how the technology will progress, the appeal of being part of a fu-

appear of being part of a truti turistic experience is a strong draw for some users. Libberton said, "In Sweden, people are very comfortable with technology and I would say there is less resistance to new technology here than in most other places."