

Public Image of Nanotechnology

Sarah Bates

National Science Foundation
Media Officer for Engineering

NSE Grantees Conference, December 10, 2014, 12 PM





Unique challenges

- Relatively low levels of understanding.
 - 24 percent of U.S. respondents said they had heard “a lot” or “some” about nanotechnology,
 - up 4 points from 2006 and 2008.
 - 44 percent of Americans reported having heard “nothing at all” about nanotechnology.



Knowledge of Science and Technology

Science in the news/daily life	% correct
Sunscreen protects from what radiation?	Ultraviolet 83
Major concern about overuse of antibiotics?	Resistant bacteria 77
Nanotechnology deals with?	Small things 65
Gas believed to cause rising temperatures?	Carbon dioxide 58
Resource extracted in "fracking"?	Natural gas 51

Textbook science

What is the main function of red blood cells?	Carry oxygen 78
The continents have been moving over millions of years and will continue to move.	True 77
Better way to test a new drug's effectiveness?	Control group 75
All radioactivity is man-made.	False 66
Which is an example of chemical reaction?	Nails rusting 66
Lasers work by focusing sound waves.	False 48
Electrons are smaller than atoms.	True 47
What gas makes up most of atmosphere?	Nitrogen 20

PEW RESEARCH CENTER/SMITHSONIAN MAGAZINE March 7-10, 2013.
Percent correct on 13 multiple-choice and true/false questions.



Interest, Information Sources, and Involvement

Four out of five Americans say they are interested in “new scientific discoveries.”

- Other science and technology (S&T) related issues also interest many Americans; these include new medical discoveries, environmental pollution, and new inventions and technologies.
- A survey of the United States and 10 European countries, including the 5 largest, suggests that interest in S&T in the United States is somewhat higher than in Europe.

The Internet has surpassed television as Americans’ primary source for information about S&T.

- About 4 in 10 Americans cited the Internet as their primary source of S&T information in 2012 compared with about one-third in 2010. The percentage of Americans saying they relied on television as their primary source of S&T information dropped between 2010 and 2012.
- Most of those who used the Internet for S&T information said they used online editions of newspapers.



- Main takeaway:
 - Opportunity to inform people.



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OH, HI; I'M HERE
FROM THE INTERNET.

\ WHAT ARE YOU DOING!?

GLUING CAPTIONS
TO YOUR CATS.



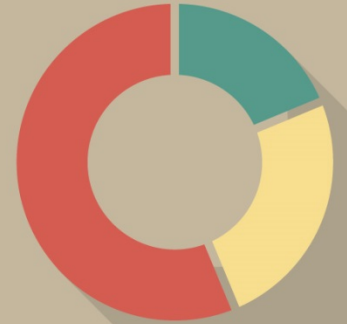
xkcd.com



DATA BY DESIGN



SNAPSHOT OF NSF'S
PROGRAMS, PROCESSES,
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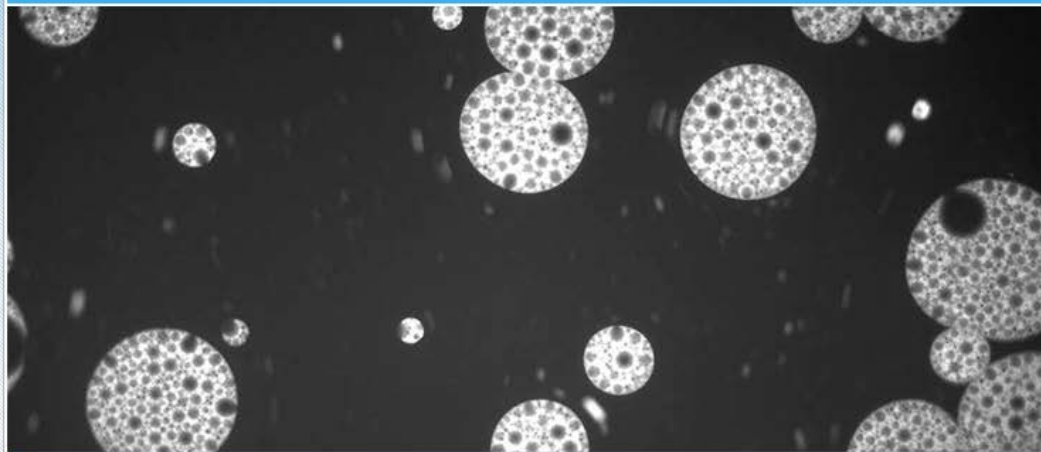
NSF channels

- NSF.gov
- Social media
- News service
- Media contacts





Advanced Manufacturing: Made to Order



***Made to order.** A phrase that began with the service industry is now vital to manufacturing's future. Manufacturing production has recently grown at its fastest pace in more than a decade, creating more economic value per dollar spent than any other sector. Adding to this surge is customization -- the ability to quickly and efficiently make what you want, when you want it.*



Manufacturing the Past, Present, and Future

NSF has shaped additive manufacturing for decades. What is behind the 3-D printing revolution? How is large-scale manufacturing going high-tech? What research will form advanced manufacturing's future?





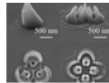
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News From the Field

Nanoparticle allows low-cost creation of 3-D nanostructures

December 8, 2014



Researchers at North Carolina State University have developed a new lithography technique that uses nanoscale spheres to create 3-D structures with biomedical, electronic and photonic applications. The new technique is less expensive than conventional methods and does not rely on stacking two-dimensional patterns to create 3-D structures. [Full Story](#)

Source
North Carolina State University

The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering. In fiscal year (FY) 2014, its budget is \$7.2 billion. NSF funds reach all 50 states through grants to nearly 2,000 colleges, universities and other institutions. Each year, NSF receives about 50,000 competitive requests for funding, and makes about 11,500 new funding awards. NSF also awards about \$593 million in professional and service contracts yearly.

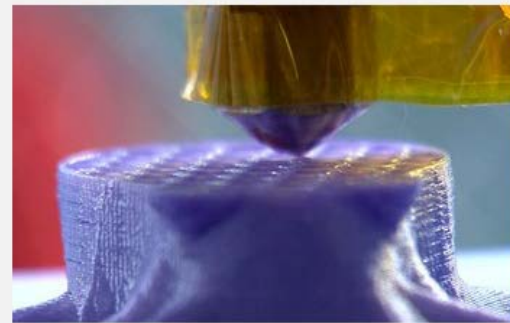
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Useful NSF Web Sites:

Discovery

The engineering behind additive manufacturing and the 3-D printing revolution

Get to know some of the foundational innovations that are creating new options for manufacturing



[View video](#)

3-D printing and other additive manufacturing techniques give engineers and enthusiasts new options. [Credit and Larger Version](#)

December 3, 2013

While 3-D pens and printers are enjoyed by students, artists and makers, innovative American companies are using similar equipment to manufacture aerospace, automotive and medical technologies. The number of technologies customized and created using additive manufacturing processes is growing each year.

But understanding how the processes work takes more than prying open your 3-D pen.

Many of the foundational techniques for additive manufacturing, briefly described below, were discovered and patented in the 1980s. [The development of three of these methods--selective laser sintering, sheet lamination and 3-D printing--had critical](#)

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Advanced manufacturing is a national priority. But what does that mean? Tom Kurfess tells us. [Credit and Larger Version](#)



[View Video](#)

How do we make thoughts into reality? Mass produce it. Tom Kurfess explains. [Credit and Larger Version](#)



Great Gov Tweets

Using data to highlight great government communication
From Measured Voice.

#24 This was the 24th most engaging Tweet from U.S. government Twitter accounts on November 26, 2014.

Within its first day, this tweet received
28 retweets
19 favorites
and reached a potential
562,382 people



National Science Fdn @NSF

#Nanotech fabrication: from stronger #Kevlar to better biology bit.ly/1p3KPQQ @NortheasternCOE @nanowerk



RETWEETS 11 FAVORITES 5



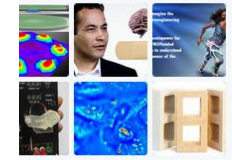
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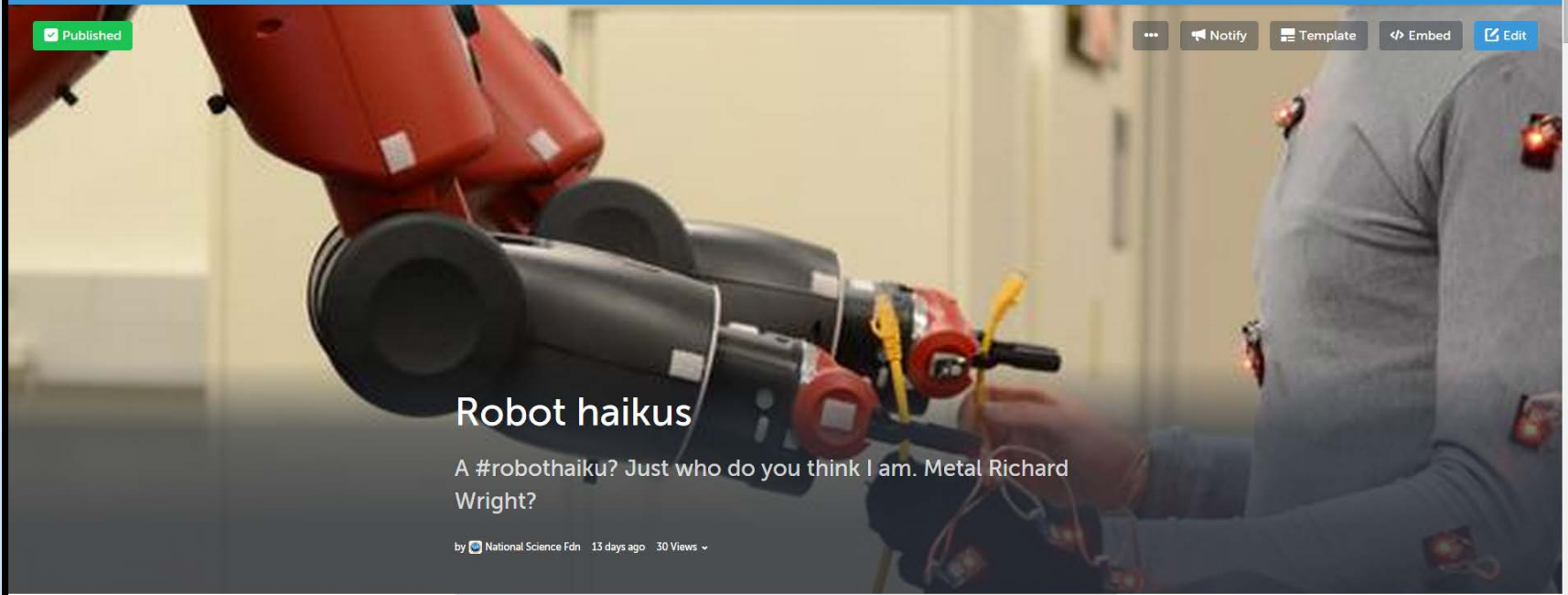


mathematician, developed the



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Robot haikus

A #robohaiku? Just who do you think I am. Metal Richard Wright?

by National Science Fdn 13 days ago 30 Views



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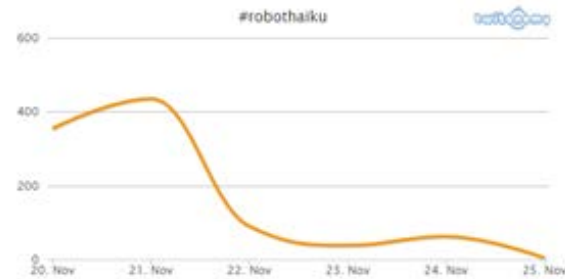


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Get insights on how it has been tweeted re

983 tweets from Nov. 20, 11:39 am to Nov. 25, 5:59 am

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683 users

Potential Reach 35,276,770

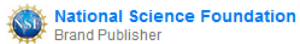




14 Reasons Diamonds Are A Scientist's Best Friend

Diamonds are a symbol of love, but to researchers supported by the [National Science Foundation](#) they are also precious for their amazing physical and chemical properties. After all, there are more things to do with diamonds than just put one on your finger. **Scientists and engineers use diamonds to:**

posted on Feb. 12, 2014, at 1:40 p.m.



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1. Grow even bigger diamonds



NOVA scienceNOW / Via pbs.org

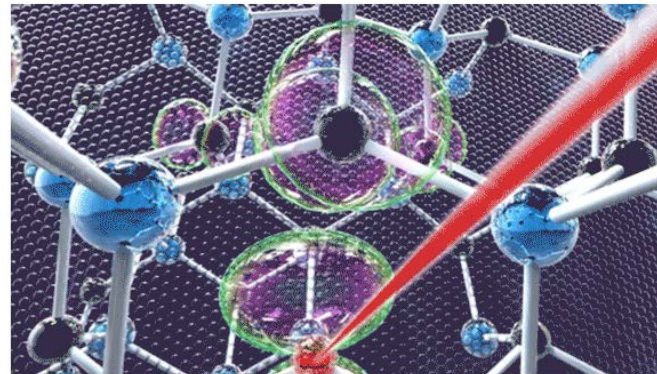
2. Learn about Earth's geological history



NSF / Via nsf.gov

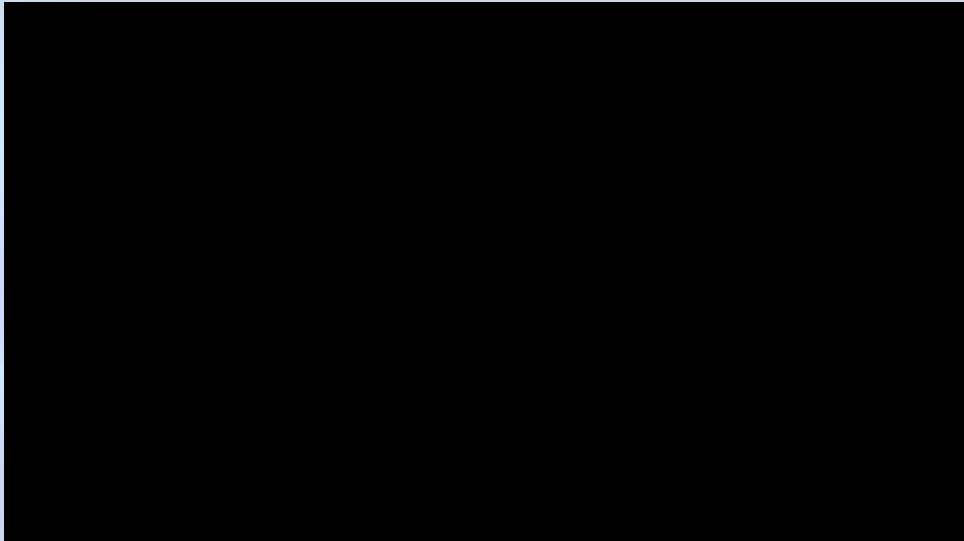
Because they form within the bowels of our planet – in the Earth's molten middle layer aka mantle – and are millions of years old, diamonds can [tell us a lot about our geological history.](#)

3. Build quantum computers



LiveScience / Via livescience.com





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Discovery

Quenching the world's water and energy crises, one tiny droplet at a time

In pursuit of beetle biomimicry, NSF-funded engineers develop new, textured materials to trap and channel small amounts of liquid



A beetle in the Namib Desert of Africa drinks 12 percent of its body weight in fog each day.

[Credit and Larger Version](#)

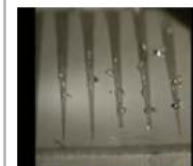
July 24, 2014

In the Namib Desert of Africa, the fog-filled morning wind carries the drinking water for a small black beetle.

The beetle slakes its thirst by tilting its back end up and sipping from tiny droplets that collect on its textured back and slide down to fall into its mouth. Incredibly, the beetle gathers enough water through this method to drink 12 percent of its body weight each day.

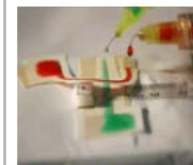
Scientists surmise that the beetle's back may be made up of hydrophilic (water-loving) areas, and hydrophobic (water-fearing)

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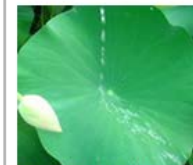
If researchers perform some beetle biomimicry, that may mean a new source for water in dry areas.

[Credit and Larger Version](#)



Researchers can trap, direct and repulse small amounts of water for a variety of new purposes.

[Credit and Larger Version](#)



Engineers look to naturally water-repellant surfaces like the lotus leaf for inspiration.

[Credit and Larger Version](#)





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The "SciGirls" TV series encourages girls to succeed in STEM!

Watch it in action: <https://www.youtube.com/watch?v=U6qy&xpwWJ8>

ScienceNation

I can predict where a person will move in the average time a human eye blinks.

Robotina

ScienceNation



Big-headed ant colonies will produce large soldiers when they encounter other ants that fight back, according to a new study UIUC Ph.D. student Bill Willis. We've got the research story on "The Discovery Files" podcast, featured @Science360 Radio: www.Science360.gov/radio

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Crystal of the Week: Lonsdaleite




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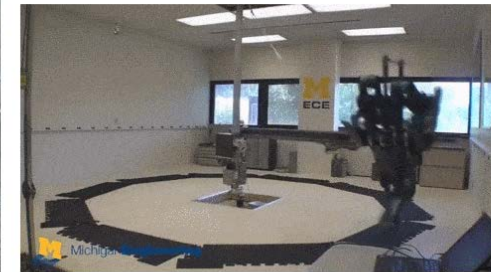
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Run, robot. Run.

MABEL, one of the world's speediest two-legged robots, can run up to 6.8 miles per hour.



Created by a team of researchers at the University of Michigan in Ann Arbor, MABEL runs a lot like a human.

MABEL was designed to mimic a human's weight distribution, and has springs that act like tendons in the human body. The robot weighs about 143 lbs, and like a human, most of the weight is concentrated in the upper half of the body. That keeps the legs relatively light, so they can quickly move forward and backward for fast locomotion.

Building bipedal robots that run and walk smoothly is a challenge because of the complexity of motion and balance, particularly over uneven terrain.

What top roboticists have to say about the future of robots and humans.

Credit: *Koushil Sreenath, Hae-Won Park, Jessy Grizzle: University of Michigan - College of Engineering*

robot running robotics engineering NSFfunded

Posted on November 28, 2014 0 comments 103 notes

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National Science ...



Through the lens

Beautiful visualizations from the worlds of science and engineering. Some of the images here, while related to NSF projects and facilities, do not represent activities funded by NSF.

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Diatoms--tiny phytoplankton abundant in the sea--from Puget Sound, Wash. NSF researchers discovered that diatoms have an animal-like urea cycle that enables them to efficiently use carbon and nitrogen from their environment. [Credit: Adrian Marchetti, University of Washington, and Andrew Allen, JCVI]

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Nanocrystalline diamond-coated endmills with innovative diamond tipped coating technology. Durable, low-friction diamond coatings allow tools to run faster for longer periods of time and with fewer replacement tools, thereby reducing manufacturing time and costs. NSF's Small Business Innovation Research program supports development of such technologies. [Credit: NCD Technologies]

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Discover how desert sidewinder rattlesnakes slither sandy slopes-- watch Science Now from NSF. #snakes, #Life Sciences, #K-12, #Education

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Like science visualizations? People's Choice voting in the 2014 Vizzies Challenge is going on now! http://go.usa.gov/AmvB Above: The American Bird Grasshopper (Schistocerca americana) is caught in mid jump as it is about to land using a specialized photographic technique called high speed flash. With this technique, the image is exposed using flash at a duration of about 1/50,000 sec. Learn more about The Vizzies.

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Vizzies public voting is on! Vote for your favorite science or engineering visualization in several categories, including photography, illustration and video.

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Aurora australis ("southern lights") blankets the sky overhead of the 10-meter South Pole Telescope at Amundsen-Scott South Pole Station, Antarctica. The telescope collects data on cosmic microwave background radiation and black matter. [Credit: Keith Vanderlinde, NSF] #antarctica, #auroraaustralis

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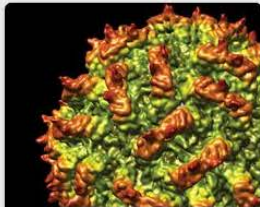
Astronomers have captured the best image ever of planet formation around an infant star as part of ALMA's testing and verification process for new high-resolution capabilities. [Credit: Video Credit: NSF Image Credit: ALMA (NRAO/ESO/NAOJ); C. Brogan, B. Saxton (NRAO/AUI/NSF)]

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A glacier calving icebergs into a fjord in the Norwegian archipelago of Svalbard, Norway. NSF-funded scientists found that summers there are warmer now than at any other



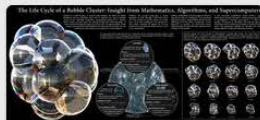
The virus Penicillium stoloniferum was reconstructed in 3-D on a



This is an artist's rendering of a biobot powered by actual muscle. It



Polarizing microscope texture of a thin, liquid crystalline film (hybrid-

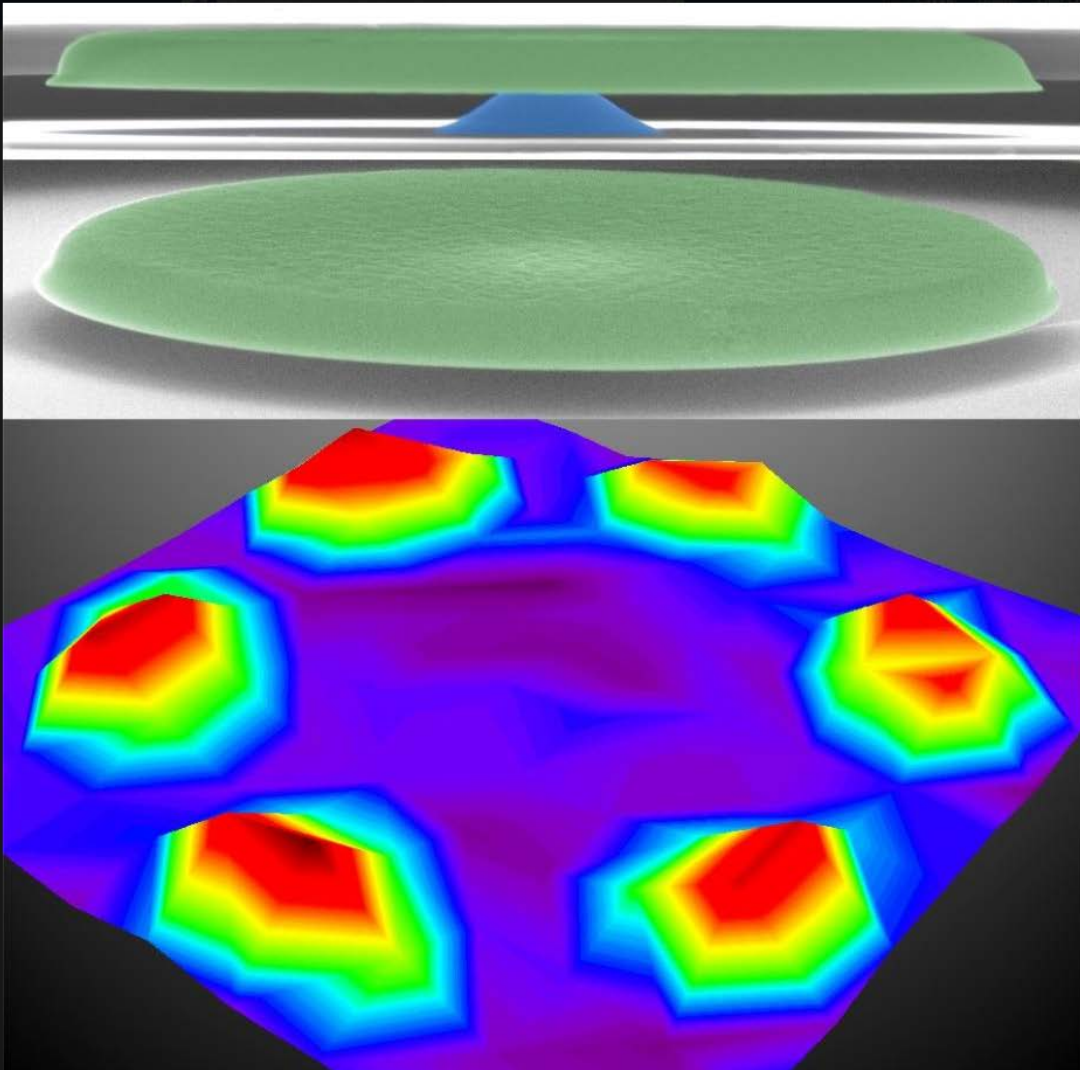


Insights into bubbles: Researchers described mathematically the stages in the complex evolution and disappearance of foamy bubbles. [Credit: Robertl. Saye and James A. Sethian, UC Berkeley and Lawrence Berkeley National Laboratory] #scienceisbeautiful, #bubbles



Why do tree leaves turn gold, orange and scarlet in the fall? See the role of pigment molecules, including chlorophyll, carotenoids and anthocyanin, in the changing leaves of autumn. #chemistry,





National Science Foundation (NSF)

Posted by Sarah Bates [?]

28 mins · 🌐

Interferometry uses the interference of #light waves reflected off a surface to measure distances. The technique was invented by physicist Albert A. Michelson, who became the first American to win a #Nobel prize in the sciences in 1907.

Recently, researchers at Case Western Reserve University used a scanning optical interferometry technique to map the shapes and textures of high-order modes of Brownian motions.

The new #technology holds promise for sensing and signal processing, and for developing optical coding for computing and other information-processing functions. #nanotech

Learn more: <http://1.usa.gov/1ubj6zO>

Image credit: Philip Feng

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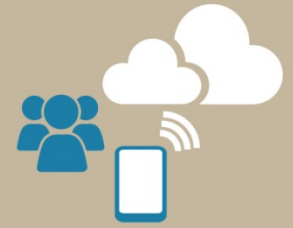


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