Impressive Nano Layer of Liquid Glass To Coat Every Surface in Your Life

9 Comments

by **Aaron Saenz** on February 5th, 2010
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What keeps the liquid from penetrating into this wood? An invisible coat of nano thin Liquid Glass.

A Germany company is determined to coat your life in a thin layer of Liquid Glass. Also known as SiO2 in ultra thin layering, this transparent film of material is only 100 nm thick (1/500 the width of a human hair) but it can repel water, deter bacteria and fungus growth, protect against wear, and still allow the surface underneath to breathe. Developed by Nanopool, Liquid Glass seems almost too good to be true. Spray it on statues and graffiti won't stick. Cover your kitchen counter in it, and it can stay clean and sterile for months. Don't want fungus growing on your plants – you can cover them with Liquid Glass and they'll be protected, and still able to live. A 30 minute application can last for a full year. The descriptions of what this substance can do are just insane and I wouldn't believe most of them if we didn't have visual evidence in their favor. Check out some promo videos from Nanopool after the break. This stuff is going to be everywhere.

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Nanotech Contact Lens Monitors Diabetes by Changing Color

2 Comments

by **Aaron Saenz** on January 15th, 2010
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Nanoparticles in a hydrogel lens change color with the glucose level in tears.

The body can be a confusing place, and when you're ill sometimes you just wish you could see what the problem is. For diabetics, that wish may be coming true. Professor Jin Zhang at the University of Western Ontario has developed contact lenses that would change color as the user's glucose levels varied. The new device is made by embedding nanoparticles into standard hydrogel. These particles react with glucose in the tears and change color. As you can see in the photo the effect is slight, but it could alert diabetics to dangerous sugar levels without the need for regular blood tests. According to the University's News site, Zhang's research was recently awarded more than $210,000 from the Canada Foundation for Innovation so that it could continue to develop nanocomposite technology.

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Nanotechnology Creates Artificial Artery for Clinical Trials

0 Comments

by **Aaron Saenz** on January 5th, 2010
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George Hamilton helped create this new artificial artery using nanotechnology.

Researchers at London Royal Free Hospital are hoping to save limbs and lives with the creation of their new artificial artery. Unlike current artery replacements, this grafting substance was created using nanotechnology and can pulse with the natural movements of the body. That pulsing will allow the polymer tube to be used in very small grafts (<8mm), giving hope that damaged arteries which would normally lead to amputations or heart attacks can now be treated. According to a recent press release, the Wellcome Trust has given [L]$500,000 to begin clinical trials of the new artificial arteries by the end of 2010. We could see the new polymer arteries in grafts, stints, and other vascular surgeries in the next few years.

Heart and vascular disease is the number one killer in most industrialized nations, and costs countries billions in health care, and lost wages. Nanotechnology, biotechnology, robotics, and stem cells are reinvigorating the development of artificial components of the cardiovascular system. We've seen hearts grown from stem cells in labs, artificial mechanical hearts, companies spending millions to develop artificial blood, and now even artificial vascular tubes which act more like the real thing. Combined with upcoming advances in robotic and micro-surgery, medicine could be on the path to conquering its public enemy number one.

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NIH Guides Nanomedicine Towards Killing Cancer

3 Comments

by **Aaron Saenz** on December 14th, 2009
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Researchers at Argonne National Labs used tiny titanium dioxide nanoparticles to burn brain tumor cells killing more than 80% after just 5 minutes of treatment.

There have been many proposed means of killing cancer cells: selective pathogens, irradiation, chemical corrosion of membranes…but my favorite has always been "burn the little bastards." Different researchers have developed means by which nano-sized particles can be attached to cancerous cells and then illuminated with white, UV, or near infrared light. Those nanoparticles then become very heated, burning the cancer they are connected to and

leaving healthy cells relatively unharmed. Earlier this year scientists at Argonne National Labs, UC Santa Cruz, and many other centers across the US have made good on large grants from the National Institute for Health (NIH) to develop the next generation of nanomedicine. In preclinical trials, these groups have enjoyed great success in killing brain tumor cells, and melanomas. While it may take years to fully realize the promise of nanomedicine, these results demonstrate that nanotechnology is on the path to defeating cancer.

The NIH's Roadmap to Nanomedicine outlines how millions of dollars in funding can be awarded to key centers around the country to promote frontiers of nanotechnology used to cure human illness. These awards don't just focus on curing cancer with nanoparticles, but also include work aiming to create nanosized devices that could repair damage in cells, and molecular machines that could cure chronic conditions (or augment human cells). Over time, this form of dedicated funding from the NIH could cement the US as the leader in nanomedicine.

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Light Used to Remotely Control Mouse Cells Like Robots

0 Comments

by **Aaron Saenz** on December 11th, 2009
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Plants use light to tell them where to move and how to grow. What if animal cells could be directed in the same way? Now they can. Researchers at the University of California San Francisco have modified mouse cells with plant proteins so that they will change shape and move in response to signals of light. As described in the recent publication in Nature, Scientists were able to get the mammalian cells to follow a weak red light and pull away from infrared light. Similar techniques can be used to control other cell functions besides shape and movement. One day, researchers hope, such modifications could be performed on human cells to help direct the repair of spinal injuries and allow cells to reconnect across gaps.

UCSF scientists placed plant proteins in this mouse cell so that it would respond to light by moving and changing shape. The cell expanded to follow the movement of a red light (circle).

While similar work has been performed in yeast and bacteria, this experiment marks the first time that mammal cells have been upgraded in this fashion. I'm impressed by the way that researchers got cells to move like miniature remote control robots, but there are greater implications. By inserting key plant proteins (called phytochromes) into mammal cells, researchers have created a light-based switch that they can insert into many different chemical pathways. The UCSF team focused on the pathways which affect the cytoskeleton, but they could have targeted protein interactions that control how food is processed, or functions that impact cell life span. Imagine using specially tuned light signals to keep some cells (say those with cancer) from processing nutrients, or encourage other cells (say those in an area with nerve damage) to repair and reproduce themselves. With the protein-based light

switch, scientists could change a cell's chemical functions temporarily, and repeat the process as needed later. That's an amazingly powerful tool.

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World's Smallest Snowman Just 10 Microns Wide (Video)

0 Comments

by **Aaron Saenz** on December 8th, 2009
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At just 10 microns wide, this snowman is only 1/5th the diameter of a human hair.

Everyone has a different way of enjoying the winter holidays. Some light candles, some sing songs, and others construct microscopic snowmen. David Cox from the National Physical Laboratories in the UK built a 'snowman' which was just 10 microns (0.01mm) in diameter out of two tin beads bonded together with platinum. The face of the snowman was carved using an ion beam, and the nose (just 1 micron across) was made of platinum deposited using a similar ion beam. Cox even simulated a snowy landscape using blue light. NPL incorporated the microscopic snowman as part of their season's greetings video. You can see it in full after the break.

The tiny snowman was more than just a reminder of winter fun, it was a demonstration of the precision and capabilities of NPL. Tin beads like those seen in the snowman are used to help fine tune atomic force microscopes (AFMs). In fact, the base that the beads are resting on in the image is the silicon cantilever from an AFM. These ultraprecise microscopy tools are what allowed IBM to image a molecule for the first time, and NPL has equally lofty goals for its own research. What I find most fascinating about the little snowman, however, is that someone had time to make it. We've reached a point where microscopy and microscopic manipulation are advanced enough that making a 10 micron figuring out of tin isn't a huge expenditure of resources. There's still quite a ways (about a factor of 100) before I'd characterize this as true nanotechnology, but fun stunts like this show that a future of nano-manipulation isn't that far away.

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Bacteria Harnessed To Power Micro-Motor

2 Comments

by **Aaron Saenz** on October 26th, 2009
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Need to power your microscopic electronics? Don't think high-tech, think Medieval. Like a team of miniature horses at a mill, Italian scientists have harnessed the movement of bacteria to turn a rotor just 48 microns wide. Researchers at the University of Rome placed an asymmetric cog in a bath of E. coli bacteria moving around randomly. Surprising many, the

seemingly random bacterial movement allowed the rotor to rotate at about 1 rpm. The work is currently published on the online archive ArXiv.org. When fully harnessed, the motion of bacteria could become a viable means to power microscopic or even nanoscopic technology.

The motion of bacteria caused this notched cog to rotate. The yellow circled dot is a reference point.

Many proposed concepts of harnessing bacterial motion actually involve harnessing the bacteria with tiny molecular strings. Others want to use the "carrot" approach, encouraging bacteria to push a rotor by making it appealing somehow. The University of Rome team's work shows that we can get power without all this effort. Just the natural movement of E. coli is enough to turn an asymmetric cog. While they will undoubtedly also pursue the harness or carrot approach, the Italian team has proven the most basic concept works. This means that we have an entirely new potential source of power at our disposal. Like batteries made from viruses we've discussed before, bacterial motors could be scaled up to function at the human scale, but are much more likely to be used in microscopic applications. Imagine tiny computer chips that you could could power with sewage (E. coli food), or biosensors that were powered and triggered by the bacteria around them.

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New Cancer Detector Chip Works in About 30 Minutes

1 Comment

by **Aaron Saenz** on October 12th, 2009
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A new chip out of the University of Toronto detects RNA strands that indicate the presence of cancer.

So there's this period of time during a visit to the doctor's when you're left alone in the office. You just saw the nurse or PA, and the doctor is playing golf somewhere, so you have to wait in your little paper dress. I was once stranded in that limbo for an hour. Wouldn't it be nice if that time could be put to good use? Researchers at the University of Toronto have developed a microchip that works with nano-materials to detect biomarkers associated with cancer. Bottom line, in about 30 minutes the new biosensor can determine if you've got the 'Big C'. Having already been proven to work with prostate cancer, the device could one day even be adapted to detect HIV, or H1N1 swine flu. Now that's a good use of my time.

Development of the cancer biosensor was published in ACS, and more recently in Nature Nanotechnology. Shana Kelley, team leader for the project, says that the cancer detection microchip is the size of a fingertip. It and related electronics could fit into a hand held device the size of a Blackberry™. That means the detection of cancer would not only be much quicker (30 minutes vs. days of lab work) but it could be portable and relatively cheap as well. Hand held detection of major diseases and illnesses would revolutionize medicine,

making it more accessible and more informative.
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IBM Celebrates 20 Years Since First Manipulating an Atom

1 Comment

by **Aaron Saenz** on September 28th, 2009
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In 1989 Don Eigler manipulated atoms to spell 'IBM'.

It was twenty years ago when Don Eigler, a fellow at IBM, made history by moving individual atoms for the first time. Like any good employee he used his new found ability to do something productive for the company: spell out ‘IBM’ using thirty five xenon atoms. With that microscopic marketing ploy began a new era of research into nanotechnology that continues today. Check out IBM’s anniversary video after the break.

IBM had long been at the forefront of atomic research, building the first Scanning Tunneling Microscope in 1981. Eigler was using a STM in 1989 when he made the discovery he could manipulate individual atoms with the instrument. Recently, IBM continued to astound the world by creating nanoscale MRI, and imaging a molecule for the first time. The ability to move atoms and molecules, and observe what you are doing, is a revolutionary technology that opens the door to molecular machines – devices built of just a handful of atoms.

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New Biosensor Finds Bacteria In Seconds

0 Comments

by **Aaron Saenz** on September 22nd, 2009
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A new project from Spain has created a means of detecting water borne bacteria in seconds.

Drinking the water in a foreign country always seems like something of a gamble. Could be clean, could be a one way trip to spending the entirety of your vacation in the bathroom. Luckily, a research team at Rovira i Virgili University in Tarragona, Spain has developed a biosensor that can detect bacteria at levels as low as 1 cell per 5 mL of water. As reported in FECYT and SINC, the project utilized carbon nanotubes and fragments of DNA to detect Salmonella tyhpi, the bacteria that causes Typhoid Fever. And the best part? Water can be tested in just a few seconds.

Bacterial infections may be an inconvenience to tourists, but they are down right deadly to third world citizens. Water borne pathogens account for millions of deaths each year world wide. Typhoid Fever alone claims 500,000+ each year according to the WHO. A quick test for pathogens will greatly increase the safety of potable water, and avoid the pandemics that often accompany infected wells. If the technology can be adapted to other bacteria…we may be talking about millions of lives saved each year.

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Waterproof Nanotech Sand Could Change Deserts into Farms

11 Comments

by **Aaron Saenz** on September 17th, 2009
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Nano-thick coatings allow sand to repel water.

Nanotechnology may conjure up images of tiny robots, or machines in our blood stream, but what about really cool dirt? DIME, a company based in the United Arab Emirates, has licensed a nanotech process to create hydrophobic sand. The extremely thin coating on each grain causes it to repel water. While similar technologies have existed for several years (see the video for 'Magic Sand' below), DIME sells a plastic wrapped hydrophobic sand that can be used to create an artificial water table. This high tech sand bag, called a HST-roll, could change the nature of farming in the Middle East. With a production of more than 3 thousand tonnes a day, DIME is on the path to help the desert bloom.

Water scarcity is an enormous problem around the world. While potable water gets all the press, irrigation is where much of the consumption happens (up to 85% in the Middle East). Regions with sandy soil leach water away as it is being used, and salt rises to the top. That's a lethal combination for crops. DIME's HST-rolls work by forming a giant water-proof layer under the topsoil. You lay them out like a pool liner. When crops are grown in the soil above, less water is needed because it isn't sucked deep underground. It also prevents salt from flowing into the topsoil. Water use could be cut by as much as 35% (granted these numbers are from DIME itself).

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Dutch Gas Station Has Robot Pumping Gasoline (Video)

13 Comments

by **Aaron Saenz** on September 16th, 2009
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Seems like there's a robot for every job.

An inventor in the Netherlands has merged the spirits of robotics with the only joy of New Jersey. No, I'm not talking about a cyborg Tony Soprano, though that would be cool. Nico Van Staveren developed the world's first robotic arm that can pump gasoline while you stay in the comfort of your car. The TankPitStop debuted in Emmeloord, Netherlands last year and has been providing petrol to the Dutch people ever since. Check out the video below. While a robotic gas pump is nice, it points to a bigger issue: we've already reached a time when robots can take on almost any task.

2008 is actually a pretty late date to get robotic gasoline pumps. The necessary technology had been ready for seven to ten years. Staveren himself got the idea for TankPitStop while watching a friend's automatic cow milking machine. We've mentioned how Willow Garage, MIT, and other robotics hubs are expanding horizons and how that could one day increase the availability of robots. But, truth be told, that day may already have arrived.

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