Benny the Bear

Emily Maletz for the NISE Network

This toy bear has nanosilver in his stuffing to keep him clean.

Silver is naturally antimicrobial, and tiny nano-sized silver particles are especially effective at killing germs. Pure Plushy originally sold this toy bear with stuffing embedded with nano-sized silver particles. They claimed that the nanosilver would keep the toy free of mold, bacteria, and dust mites, making it safer for children with asthma and allergies. When consumer advocates asked whether the nanosilver was safe for children, the company, without conclusive substantiation, decided to avoid controversy and replace it with a chemical pesticide. However, there is currently no scientific evidence showing that nanosilver is harmful to humans.

nanoCotz Bio-Green

iStockphoto

Fertilizer makes plants grow faster and healthier.

NanoCotz Bio-Green was a fertilizer made from plants, including corn, soybeans, and potatoes. The company claimed that colloidal chemistry would increase the absorption of nutrients through plants' roots, accelerating plant growth and creating healthier, tastier crops. The fertilizer was nontoxic and biodegradable, and could be used on everything from food crops to ornamental plants. However, It is no longer manufactured, perhaps because it was relatively expensive.

Nanosilver socks

Emily Maletz for the NISE Network

Socks with nanosilver can kill smelly bacteria.

Nano-sized silver particles are one of the most common nanomaterials used in consumer products. Silver is naturally antimicrobial, and tiny nano-sized particles of silver are especially effective at killing germs. Wigwam SmartSilver socks use nanosilver to kill the bacteria that make feet smell. They cost a little more than ordinary socks—about $12 a pair.

Nanoparticle sunblock

Emily Maletz for the NISE Network

Sunblocks with nanoparticles provide invisible sun protection.

Sunblocks are one of the most common products containing nanotechnology. Many sunblocks contain nano-sized particles of zinc oxide or titanium dioxide to protect skin from the sun's rays. While older products left a visible white film, formulations with nanoparticles are transparent.

Dust-free ceiling fan

Jameson Welmore for the NISE Network

Fan blades with a nanoparticle coating blow dust away.

Hunter Fan offers Dust Armor protection on their ceiling fans, which keeps them dust-free. The fan blades are coated with nano-sized particles that repel water, so when moisture in the air comes in contact with the fan, the water sweeps away dust as it slides off the blades.

Golf clubs

iStockphoto

Golf clubs use carbon nanotubes to drive the ball farther and straighter.

Yonex Nanospeed 3i irons have carbon graphite shafts designed to allow golfers to hit longer, straighter drives. Tiny carbon nanotubes at the tip of the shaft bind the graphite fibers closer together, increasing the material's strength and resiliency. The result is greater energy transfer, which increases impact speed and sends the ball farther.

Insulating shoe inserts

iStockphoto

Footwear inserts use nano-sized bubbles to keep feet warm.

Shock Doctor Hotbed inserts, made by Aspen Aerogel, have a material called Pyrogel that keeps feet warm and dry. Tiny nano-sized bubbles of gas block heat and cold. This technology is up to six times more effective than other insulators, and is used by NASA, the US military, and the Canadian National Ski Team.

Nanosilver wound dressing

iStockphoto

Wound dressings have nanosilver particles that kill germs.

NUCRYST Pharmaceuticals manufactures a wound dressing that uses nanosilver to disinfect wounds. Silver is naturally antimicrobial, and tiny nano-sized particles of silver are especially effective at killing germs. Acticoat dressings use nano-sized silver particles to destroy pathogens, including drug-resistant bacteria. The particles release silver ions continuously for up to seven days.

Self-cleaning paint

iStockphoto

Exterior paint uses nano structures to repel water and dirt.

StoCoat produces an exterior coating, Lotusan, that mimics the surface of lotus plant leaves. The coating has micro-sized bumps covered in tiny nano-sized whiskers that repel water. When water comes in contact with the surface of the paint, it beads up and rolls off, carrying dirt with it.

Skin cream

iStockphoto

Skin care products are personalized.

Bionova creates personalized skin care products that use nano-quantities of “biologically active” substances to target specific concerns. For example, they claim their product line for tennis players provides protection from grass allergies, scalding sun, and finger injuries caused by adjusting racket strings. Face, body, and hand creams can be individually formulated based on a customer’s age, sex, skin type, ethnicity, lifestyle, and local climate. This customization comes at a price, however: a half-ounce bottle can cost hundreds of dollars.

Nano-textile mattress tops

iStockphoto

Mattresses use special nanotech fabrics to repel liquids and stains.

Simmons uses layers of high-tech fabrics to cover their HealthSmart mattress tops, making them stain-resistant and washable. One layer is made from Nano-Tex, a special fabric. During manufacture, the fabric is dipped into a solution that coats it with tiny, nano-sized “whiskers” that keep liquids from soaking into the fabric.

Pregnancy test

Emily Maletz for the NISE Network

Gold nanoparticles create the red line on pregnancy tests.

Pregnancy tests work by detecting a hormone, hCG, found in the urine of pregnant women. The First Response home test uses nano-sized gold bonded to antibodies. If hCG is present, the hormone bonds with the antibody. It carries the nano gold up a membrane, creating a dark pink line. The line is reddish because nano gold looks red, not golden.

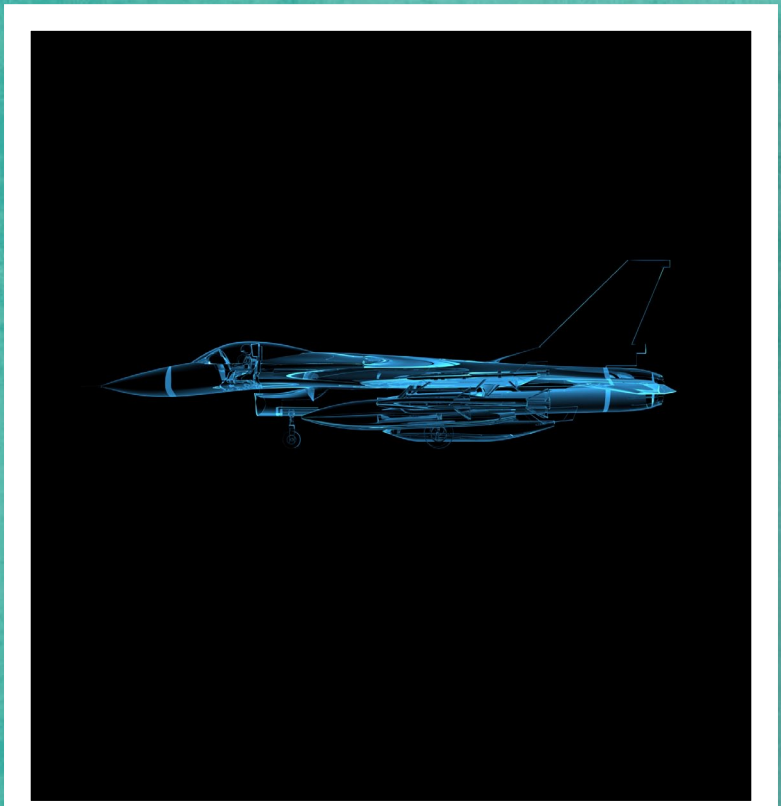
Plastic beer bottles

Emily Maletz for the NISE Network

Clay nanoparticles make plastic bottles strong and impermeable.

Voridian Company embeds clay nanoparticles in plastic to create Imperm, a shatter-resistant material that's perfect for beer bottles. The nano-sized clay molecules not only make plastic bottles strong, they also help keep beer fresh by sealing in carbon dioxide. Plastic beer bottles are sold at sporting events and other places where glass bottles present a hazard.

Stealth paint



iStockphoto

Special paint absorbs radar waves, making war planes "invisible."

The Israeli company Nanoflight has developed a special paint that it claims makes planes, missiles, and other flying objects difficult to detect with radar. The paint absorbs radar waves and releases them as heat. An irregular radar signal bounces back to the radar detector—too weak for it to identify the object or pinpoint where it is.

Ballistic vest

iStockphoto

A nanotechnology coating makes nylon fabric bulletproof.

First Choice Armor uses a fabric coating to help its ballistic vests absorb the force of a bullet and spread it over a larger area, reducing injury. Nanorepel technology impregnates rip-stop nylon fabric with tiny hydrocarbon chains, allowing the finished vest to remain soft and flexible. The N-Force ballistic vest can be used to protect law enforcement officers from gunshot wounds and motorcycle riders from dangerous falls.

Zyvex Piranha unmanned boat

Courtesy of Zyvex Marine and Zyvex Technologies

Carbon nanotubes make this military boat strong and light.

The Zyvex Piranha is a 54-foot watercraft that weighs only 8,000 pounds but can support up to 15,000 pounds. The boat is made of a carbon fiber material reinforced with carbon nanotubes, which makes it remarkably strong, light, and fuel-efficient. This boat was designed as an unmanned surface vessel (USV) for surveillance and patrol operations, but it can also carry a human crew.

Nanosilver
hospital curtains

Bigstock photo

Nanosilver makes hospital curtains germ-free.

Nano Mask hospital curtains use nanosilver to help eliminate dangerous infections acquired in hospitals. Silver is naturally antimicrobial, and tiny nano-sized particles of silver are especially effective at killing germs. The curtains have been certified to eliminate nearly all pathogens (such as staph and pneumonia) that come into contact with them, as well as mold and fungi. They're flameproof, dustproof, antistatic, recyclable—and they come in three different styles and 13 different colors.

Nanoparticle mask

iStockphoto

Masks with nanoparticles trap and kill germs.

Nanoparticle masks have clusters of tiny nano-sized particles on the surface of the filter, so they kill the germs they capture. Regular masks can stop bacteria, viruses, and contaminants from entering your lungs, but they remain on the surface of the mask. Nanoparticle masks were used by healthcare workers during the SARS outbreak of 2003.

Nanocoatings for food

iStockphoto

Waxlike nanocoatings keep food fresh

A very thin nanocoating can be applied to help keep fruits and vegetables fresh. This waxlike coating is edible, and protects the color and flavor of fresh produce.

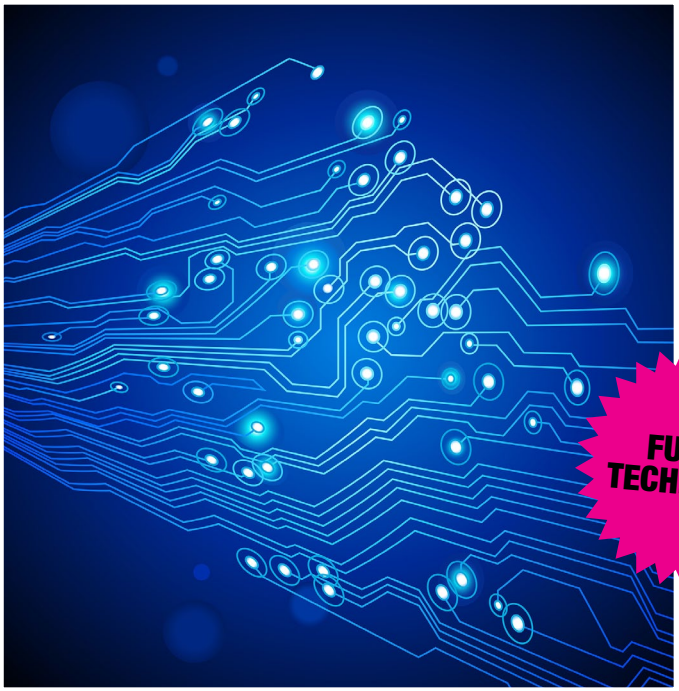
Flexible solar panels

Courtesy of Konarka

Portable solar panels provide energy anywhere.

Thin-film solar panels are made of bendable nanolayers of material. They produce almost as much electricity as traditional photovoltaic panels, but they're lighter and more durable. They're designed to be rolled up so they can be easily transported for use in different locations. These small, portable panels can provide a personal power source anywhere in the world.

Intracellular computer chips



iStockphoto

Computer chips could be inserted in our cells to detect disease.

In the future, computer chips may become so small that they can fit inside a cell. Already, computer chips use tiny nano-sized parts that make them faster and smaller. By the year 2020, manufacturers may be able to make transistors so small that 2,500 of them fit inside a living cell. This could allow intracellular computer chips that might be able to detect diseases and prompt our cells to begin repair.

Nanomachines
to build body parts

Future nanotechnology might rebuild missing limbs or organs.

In the distant future, nanotechnology might enable us to harvest almost any material and recombine it to create replacement body parts. Tiny nanomachines might sense damage to our bodies and automatically create manufacturing units to repair it. The technology might be used to regrow limbs in a hospital, or even allow injured soldiers to repair their wounds on the battlefield.

High-tech military clothing

iStockphoto

Nanotech clothing could provide camouflage and repel bullets.

In the future, military clothing might incorporate many nanotechnologies to protect soldiers. Nano-sized machines might control the temperature inside battle fatigues, provide life-support systems under water, and enhance the user's ability to run and jump. The skin of the clothing might protect from bullets and shrapnel, provide camouflage, and even shift shape and color to emulate other clothing.

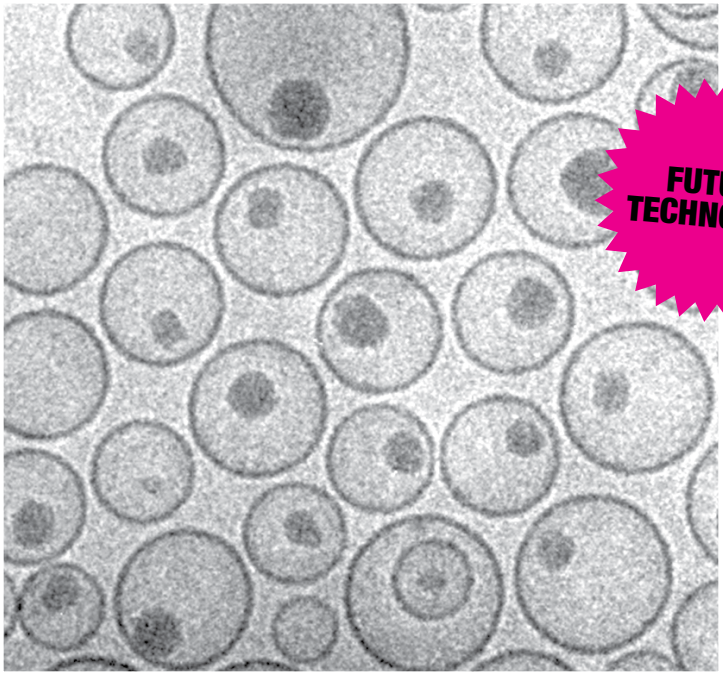
Tea bag water filter

Stellenbosch University Water Institute, www.sun.ac.za

Portable nanofiber filters will purify water.

This water filter is packaged like an ordinary tea bag. It can be taken anywhere in the world and stuffed into the neck of an ordinary water bottle for use. The tea bag is coated with nano-sized antimicrobial fibers and filled with activated charcoal. The fibers and charcoal work together to trap and kill harmful bacteria and toxic chemicals. Each “tea bag” filter costs less than five cents and can produce one liter of clean water.

Drug nanocapsules



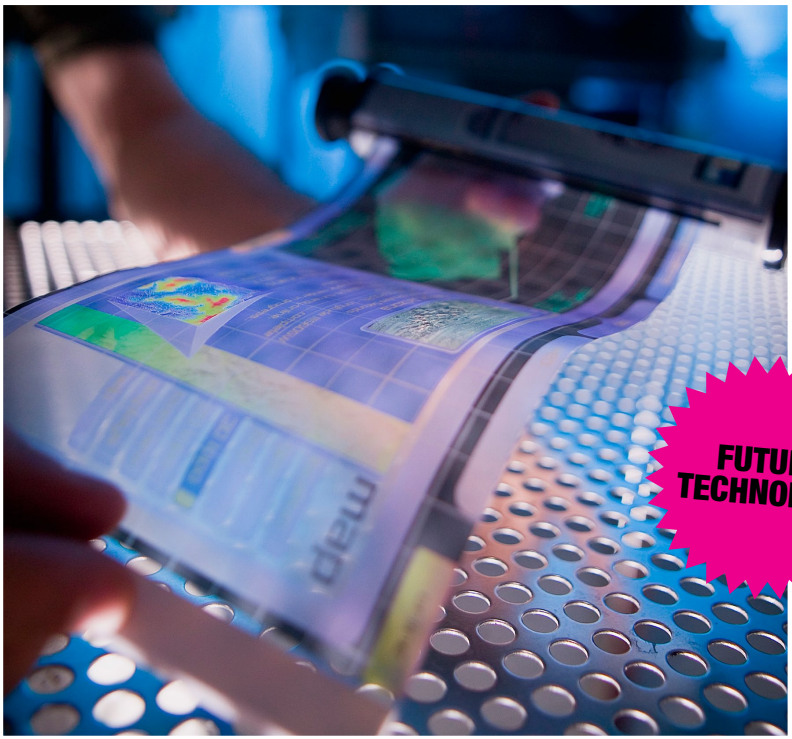
FUTURE TECHNOLOGY

Katarina Edwards / Uppsala University

Nano-encapsulated drugs might provide more effective treatments.

In the future, medications may be placed inside tiny nanocapsules that release their medication in a targeted location, reducing side effects. They could also be formulated to release medication over a period of days or weeks, so patients wouldn't need to remember to take it. Tuberculosis or cancer patients could receive slow-release, nano-encapsulated medication that provides more effective and convenient treatment.

Flexible displays



Phillip Spears / Arizona State University

Thin, bendable electronics can be printed on paper and fabric.

Today, a number of nanotechnologies are combined to make bendable electronic displays. Super-thin circuits can be printed on transparent plastic materials. In the future, it may be possible to print electronics on fabric and paper. We might have smart fabrics that can change color or become waterproof when it rains, and electronic displays that can be shrink-wrapped onto any product.

Climate engineering nanoparticles

FUTURE TECHNOLOGY

iStockphoto

Nano-sized disks could be used to engineer the Earth's climate.

One strategy for addressing climate change is to reduce the amount of sunlight that reaches the Earth's surface. Some engineers propose developing nano-sized particles that can be shot into the atmosphere to reflect sunlight back into space. They suggest that the special disk shape and tiny size of the particles will keep them aloft above the stratosphere, reducing their impact on the ozone layer.

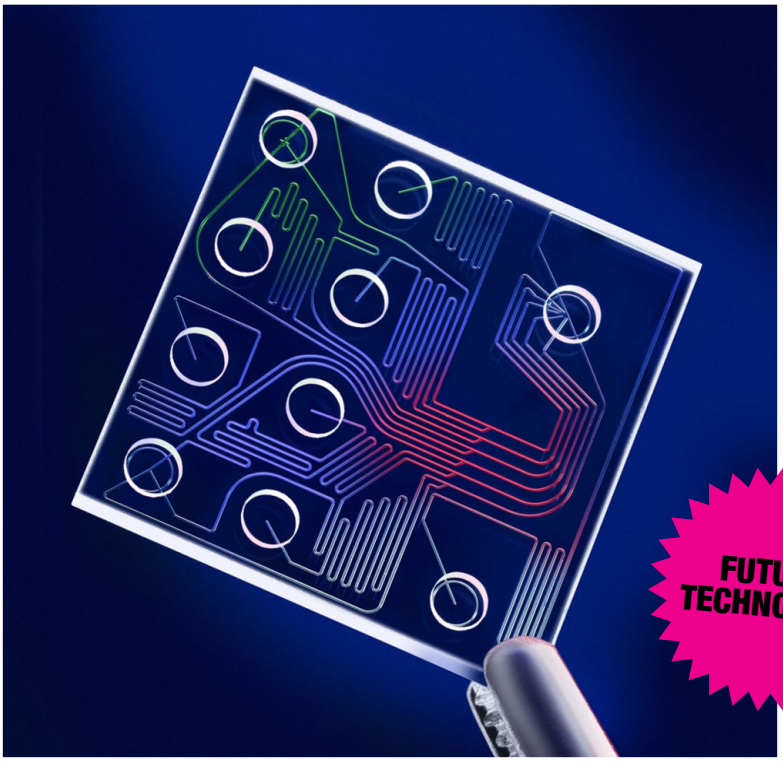
Nanofiber packaging materials

iStockphoto

Green packaging can be made from plant-based nanofibers.

New biopolymer technology uses plant materials to create thin, strong nanofibers. In the near future, these nanofibers will be made into packaging materials such as bags, boxes, and wrappers. Nanofiber packaging will be recyclable and biodegradable, in contrast to existing packaging materials made from petroleum-based plastics.

Lab on a chip

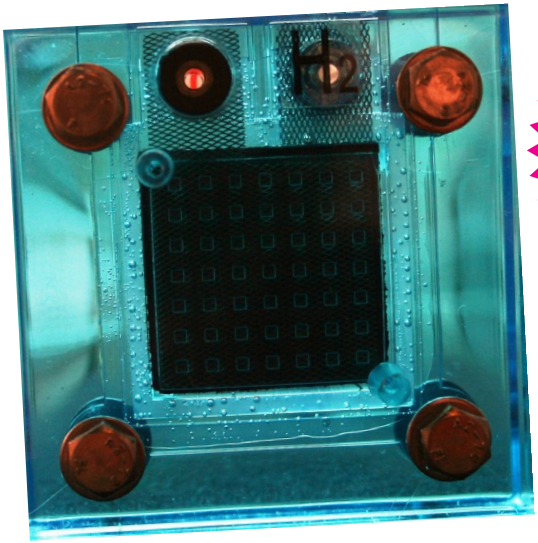


Courtesy of Agilent

Tiny chips might quickly screen for diseases.

In the future, small chips the size of a postage stamp may take only a drop of blood and a few minutes to run a whole variety of medical tests. These “labs on a chip” will owe their efficiency to their micro-sized channels and nano-sized sensors. Patients could quickly learn if they have diseases or have been exposed to toxic chemicals.

Nanoparticle fuel cells



FUTURE TECHNOLOGY

iStockphoto

Nanoparticle catalysts could generate clean energy for cars.

Fuel cells convert chemical energy into electrical energy without combustion, so they're a clean, efficient way to generate power. Fuel cells have been in use since the NASA space missions of the 1960s. Today, they power a handful of the cars on the road. Nanotechnology researchers are working to make fuel cells smaller, lighter, and cheaper. As more efficient nanoparticle catalysts are developed, the use of fuel-cell cars may become more widespread.

Wireless nanosensor networks

iStockphoto

Military "smart dust" could find and track enemies.

In the future, networks of nano-sized sensors might be used during warfare to monitor an area for enemies. Tiny particles of "smart dust" could be distributed through the air or by hand. They would look for evidence of enemies such as movement, human respiration, or blood. The particles would then communicate with each other and send signals to people through handheld monitors.

Nano-enhanced vision

iStockphoto

Nano-sized “dots” might improve vision.

In the future, nano-sized semiconducting quantum dots could be injected into the retina of the eye to aid vision. These tiny, spherical particles fluoresce when light hits them, amplifying the light coming into the eye. This technology could aid people with poor eyesight, or enhance vision for people with normal eyesight.

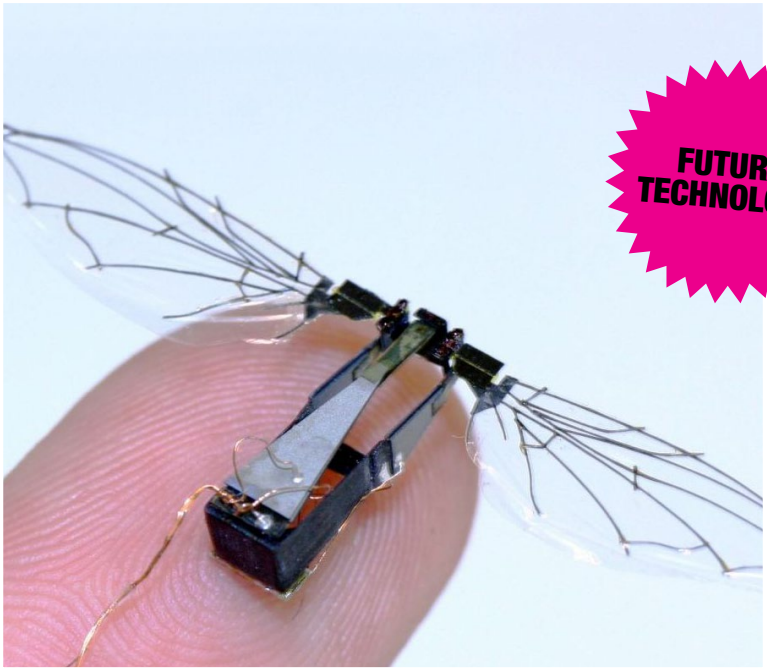
Invisibility cloak

iStockphoto

Nano-sized structures could make objects invisible.

In the future, it may be possible to place a nano-structured "invisibility cloak" around objects to make them disappear. Researchers have already designed a cloak of nano-sized structures, which refract (bend) light around an object, making it disappear into its background. So far this has only been demonstrated on the microscopic level, but one day we might be able to make objects as large as airplanes invisible.

Mini drone robots



FUTURE TECHNOLOGY

Ben Finio / Harvard Microrobotics Lab

Small spy drones will be used in warfare.

Military drones used for surveillance are becoming smaller, thanks to the use of nanotechnology. In the near future, armies might deploy nano-enabled mini drones with a wingspan about the size of a dime. These drones would send real-time images and other data back to soldiers positioned safely away from the field of battle—or even officers on the other side of the world.

Bio-readout tattoos

Emily Maletz for the NISE Network

Nanoink could provide a real-time readout of body functions.

In the future, nanosensors injected into the upper layer of the skin could provide a constant monitoring of the body's functions, including blood pressure, temperature, heart rate, and glucose levels. These sensors could be linked to a tattoo that uses special ink to provide a readout. This technology could be used by diabetics and others who need to monitor their health closely.

Self-repairing paint

iStockphoto

Self-healing car paint will be made from nanoparticles.

Scientists are developing a polyurethane coating that can heal itself when exposed to sunlight. Chitosan, derived from crustacean shells, is incorporated into polymer materials used to protect car paint. When damaged, the chitosan responds to UV light by forming chemical chains that bond with other materials and fill in the scratch.

Nanowire mat

iStockphoto

Mats made of nano-sized wires could mop up major oil spills.

In the future, nanowire mats could serve as super absorbent, reusable sponges for environmental cleanup. It can be very difficult to separate oil from water after an oil spill. But nanowires can be made of a material that soaks up oil and repels water. Nanowire mats containing many tiny pores could absorb up to 20 times their weight in oil.

Genome sequencing device

iStockphoto

Nanopores gather genetic information quickly and cheaply.

Future devices will be able to sequence human genomes by threading DNA through a series of nanopores. These tiny holes measure changes in electric currents as the DNA passes through. That information could be used to analyze a person's genetic identity. For under $1,000—and a tiny sample of saliva—patients could sequence their own genome, allowing doctors to personalize their medical care.

Space elevator

FUTURE TECHNOLOGY

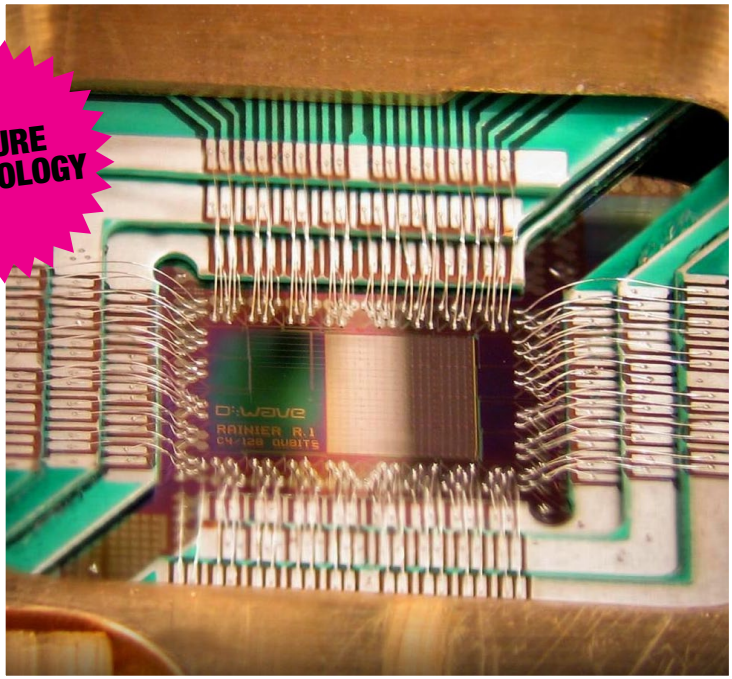
Pat Rawling / NASA

An elevator could bring people and materials to outer space.

New nanotechnologies and materials such as carbon nanotubes may make it possible to build an elevator to space. Teams in the US and Japan are working to achieve this dream, first conceived in the late 1800s. Most current space elevator designs include a base station orbiting in space, and a cable stretching down to Earth. If we could take an elevator car rather than a rocket, space travel might be as cheap as a commercial plane flight.

Quantum computer

FUTURE TECHNOLOGY



Wikipedia / D-Wave Systems, Inc. / CC-BY-3.0

Quantum bits could process information a million times faster.

Today's computers use a binary system, where every bit of information is either a 0 or a 1. We might be able to greatly increase computer memory and processing power by using quantum bits, which can exist in more than one state simultaneously (both a 0 and a 1, for example). Researchers suggest that quantum computers could solve problems in seconds that would take today's computers billions of years.