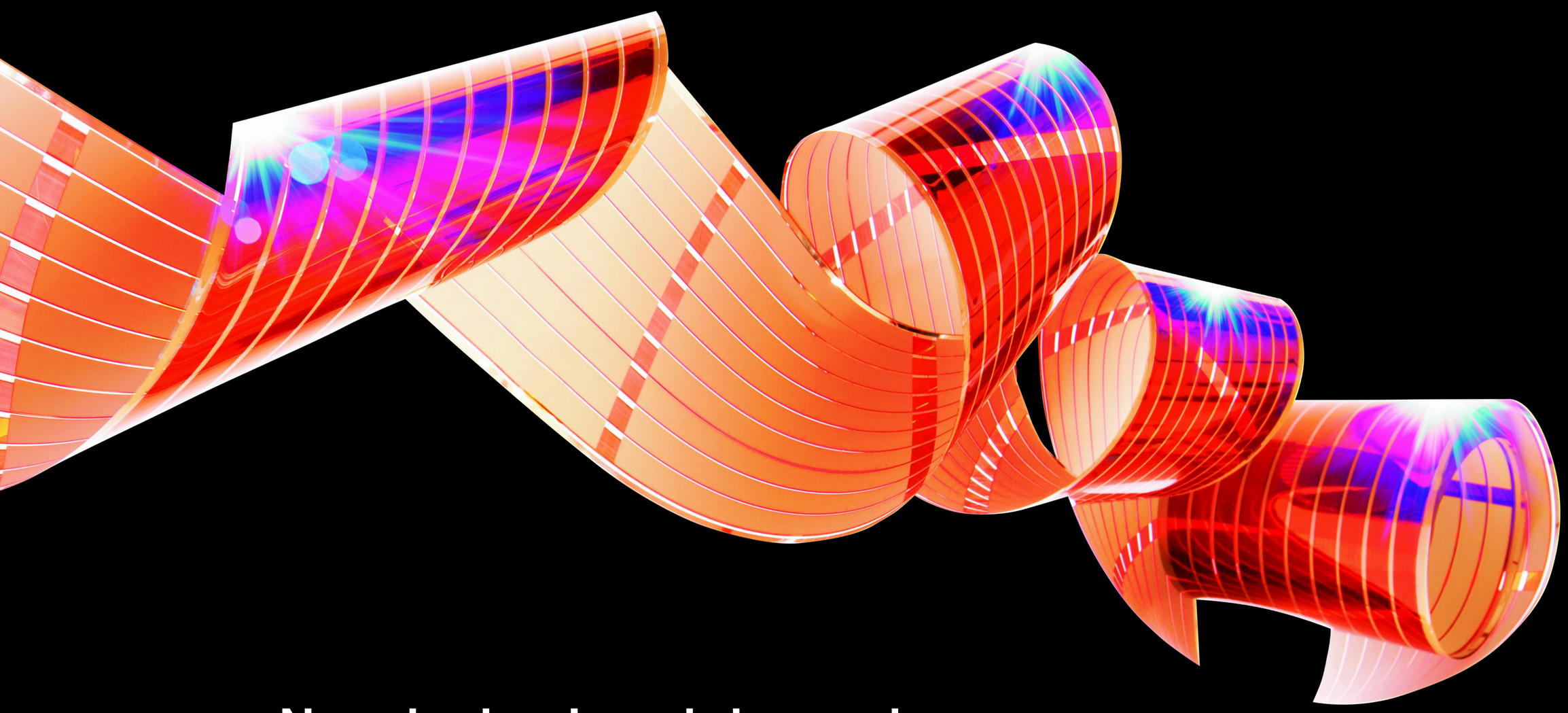
Will nanotechnology solve our energy crisis?



Nanotechnology is improving how we harness the sun's energy.

Nanotechnologies could deliver world-altering changes in the ways we create, transmit, store, and use energy. Scientists are working to develop super-efficient batteries, low-resistance transmission lines, and cheaper solar cells. However, the likelihood and time frame of these developments is unknown.

The next generation of solar cells is thin film solar cells—flexible sheets of solar panels—that are easier to produce and install, use less material, and are cheaper to manufacture. These sheets can be incorporated into a briefcase that charges your laptop, woven into wearable fabrics that charge your cell phone and iPod, or incorporated into windows that can supply power to high-rise buildings.

Nanotechnology-enabled energy production and distribution has the potential to solve a number of pressing energy issues. Reworking our enormous, highly integrated energy infrastructure will not be an easy task. How can these new technologies fit into domestic energy policies to best benefit society?

What is nano?
Nano is the scientific term meaning one-billionth (1/1,000,000,000). At this size, the size of atoms and molecules, materials take on new properties. Nanotechnology is the manipulation of materials at the nanoscale to take advantage of these properties. For more info visit **www.whatisnano.org**

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http://cns.asu.edu/nanoquestions

Will nanotechnology improve living conditions around the world?

Nanofilters can produce safe drinking water.

In many parts of the world, people don't have access to safe drinking water. New nanofiber water filters can remove bacteria, viruses, heavy metals and organic materials from water. They're relatively inexpensive and easy to use, so nanofilters could be widely employed in developing countries.

Providing pure drinking water would help prevent disease in many parts of the world, but it wouldn't resolve many basic inequalities.

Emerging technologies can help us address specific problems, but there's no "magic bullet" to improve life for all human beings. How can we develop and share promising nanotechnologies in ways that are equitable and responsible?

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Would you use a dangerous technology?

Gasoline is toxic and flammable.

Gasoline can be dangerous, but because it's useful, we have regulations for producing, transporting and using it safely. It's part of our daily lives, so we rarely consider all the systems we have in place to make gasoline safe. But when emerging energy technologies hit the market, we'll need to create new regulations to ensure safety.

New applications of nanotechnology might provide clean, efficient sources of energy. If so, they'll have a profound effect on our society. After all, our reliance on gasoline-powered transportation affects our daily lives, the design of our communities and our natural environment.

As new technologies—including nanotechnologies—are developed, we'll reap new benefits but also face new risks. And our lives, relationships and ways of looking at the world will change in ways we can't always predict. How can we think ahead and plan for these changes?

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What's hidden in *your* sunblock?

Many sunblocks contain nanoparticles.

If your sunblock rubs in clear, it might contain nanoparticles. Nanosized particles of zinc oxide or titanium dioxide are too small to reflect light, so they don't leave a white film on skin. The label will tell you the ingredients in your sunblock, but it doesn't have to say what size the particles are.

Although studies suggest that the sunblocks are safe for humans, some people worry that the tiny nanoparticles may impact the environment when they wash off our skin.

Nanotechnologies are difficult to regulate because they're hard to detect and to define, and we don't really know how safe or dangerous they are. Do you think manufacturers should be required to let you know if their products contain nanotechnology? Would you use a sunblock with nanoparticles in it on your skin?

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Are you being tracked?

New surveillance tags are so small, you might never know.

Radio Frequency Identification (RFID) is used for logging livestock, library books—and you. If you have a U.S. passport issued after 2006, it contains an RFID tag. You might also have a transponder in your car to pay road tolls. The human hands in this x-ray have RFID devices embedded in them, similar to identification chips used for pets.

Many people find that the convenience of tracking tags outweighs their concern for privacy. But in the future, tiny nanosized surveillance devices would be impossible to detect without special equipment. Some existing tags are already as small as dust! How do you feel about tracking now? Would you feel differently if the size of the sensors changed?

Currently, the ability to read these tags at a distance is limited to a few feet. Nanotechnology could help make smaller, more powerful tags and sensors. As these tags and sensors get smaller and the technology to read them improves, it may be more difficult to protect individual privacy. Would you use a tiny tag to watch a rebellious teen? What about an elderly parent with Alzheimer's?

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Does nanotechnology belong in toys?

Nanosilver is found in many consumer products.

Silver is naturally antibacterial, and tiny nanosized silver particles are especially effective at killing germs. Nanosilver is used in bandages, cutting boards and washing machines—and at one time, was even found in a stuffed teddy bear.

Nanosilver can help prevent infection, but widespread use of nanosilver could contaminate water supplies, kill fish, or lead to silver-resistant germs.

Any technology has risks and benefits. When one person or group benefits, others may be put at risk. Who should make decisions about whether to use certain nanotechnologies? Does it make sense to use nanosilver catheters to prevent infections in hospitals? What about using a nanosilver washing machine at home?

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