

KNOW NANO

FREQUENTLY ASKED QUESTIONS ABOUT NANOTECHNOLOGY AND NANOELECTRONICS



A NANO STATE OF MIND.

Q&A

What is a nano?

A prefix meaning one-billionth of a unit. For example, 1 billion nanoseconds equals 1 second, so 1 nanosecond is one-billionth of a second.

What is nanotechnology?

Nanotechnology is the creation of atomic-scale devices and systems that have special properties because of their incredibly small size. It has the potential to affect virtually all of the devices and materials we deal with in everyday life, from consumer products to food and medicine.

How big is a nanometer?

A nanometer is a millionth of a millimeter, or about 10 hydrogen atoms long. Transistors are being made as small as 22 nanometers. By comparison, an average human hair is about 100,000 nanometers wide.

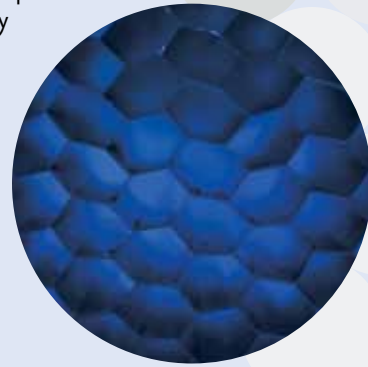
What is the field of nanoelectronics?

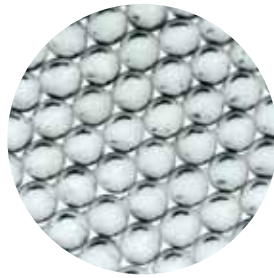
Nanoelectronics, a subset of nanotechnology, involves the creation and technology of electronic devices with dimensions up to 100 nanometers.

Nanoelectronics often refers to the use of nanotechnology on electronic components, especially transistors so small that they involve inter-atomic interactions and quantum mechanical properties at a subatomic scale.

How will nanoelectronics make the world a better place?

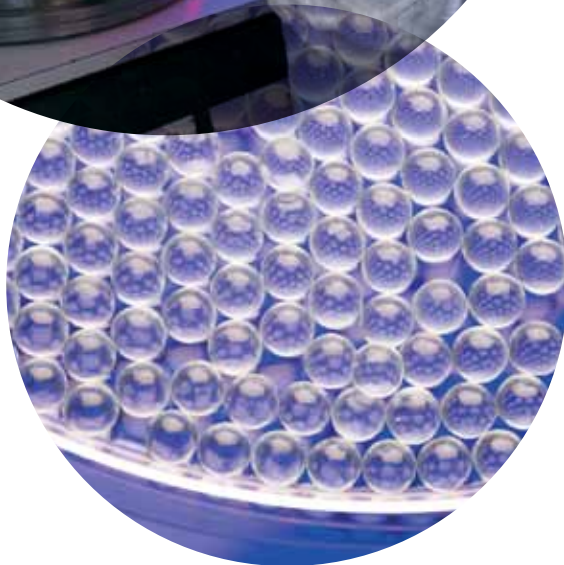
Breakthroughs in nanoelectronics will permit more speed and functionality in microscopic packages. It will result in the creation of new devices — from smaller and better implantable heart pacemakers to tiny hearing aids and other less-obtrusive electronics. More efficient solar panels and sensors will lead to the development of new green technologies.





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How big is the nanoelectronics industry?

Looking ahead, the emerging nanoelectronics industry will be very significant, economically speaking. From 2009 to 2014, the cumulative average growth rate of the nanoelectronics market is expected to be 45.3 percent.

By 2015, the nanoelectronics field could reach the trillion-dollar range according to the National Science Foundation.

What is the biggest challenge facing the nanoelectronics industry?

Most experts agree that the current complementary metal oxide semiconductor (CMOS) technology used in microprocessors, microcontrollers and other digital logic circuits will reach the end of its miniaturization progression by 2025 — hitting physical, technological and economic limits.

So, the big challenge facing scientists is to create novel computing devices and molecular or graphite switches to replace the CMOS transistor as a logic switch by 2020.

Why is South Bend attractive to technology companies?

Companies can take advantage of the world-class nanoelectronic research being conducted at the University of Notre Dame's Center for NanoScience and Technology. In addition, South Bend is home to one of four national nanoelectronics research centers — the Midwest Institute for Nanoelectronics Discovery (MIND) — which aims to develop a new class of semiconductor materials that are more advanced than today's computer chip technologies.

A key incentive for data-intensive commerce is South Bend's St. Joe Valley Metronet. This lightning-fast loop of fiber-optic cable is more than 50 miles long — and growing. A high-speed data network with virtually limitless bandwidth, the Metronet unites local businesses, education and government. It provides affordable access to a large number of national carriers and Internet service providers.

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