

PSMA Nano 200

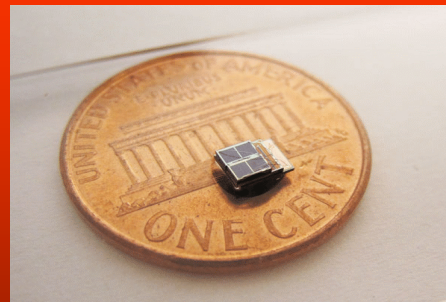
a succinct nanotechnology tutorial in four packets

- Nano Notions Remembered
- Nanotechnology Science
- Nanotechnology Research
- Nanotechnology Industry

A Synopsis



To View



To Read

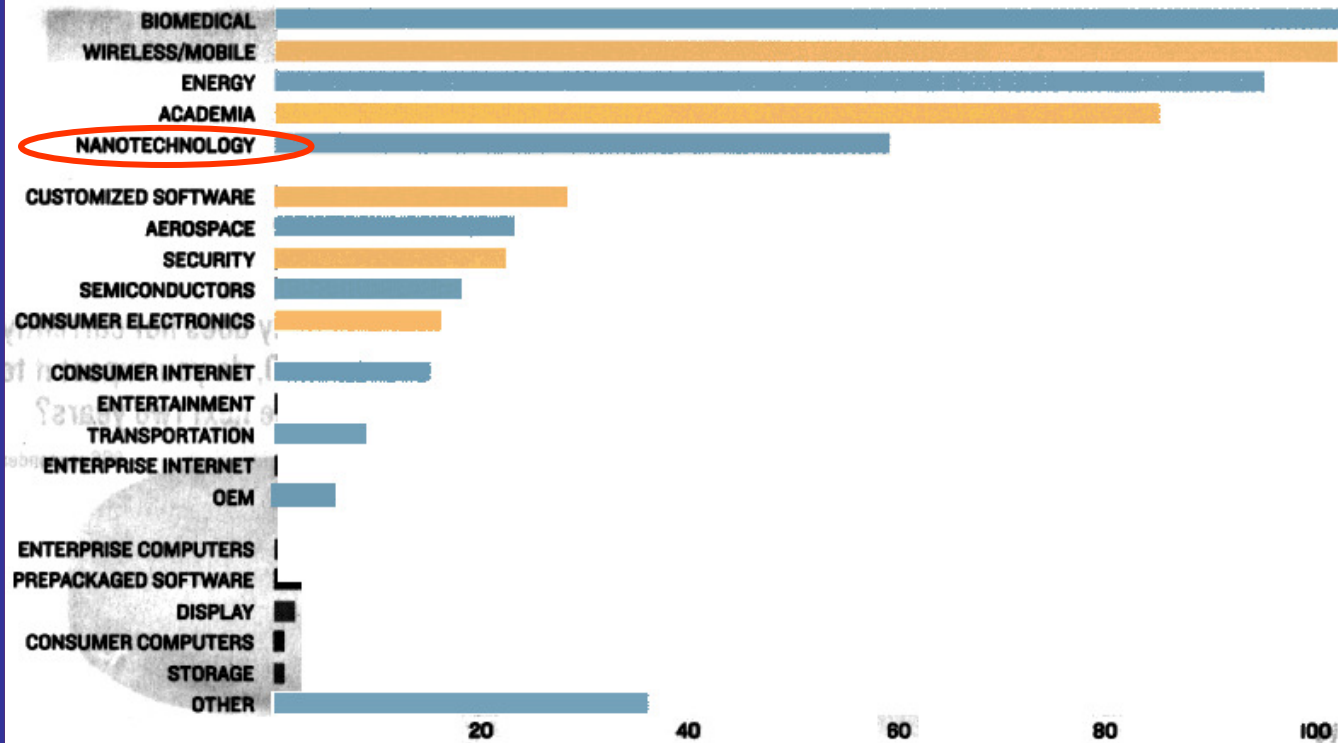


Your Best Bet for the Future

646 respondents

What technology area, including academia, would you advise students interested in R&D to get involved with?

Results are shown in number of votes.



Nanotechnology keeps you ahead of the technology Power Curve.



The Potential



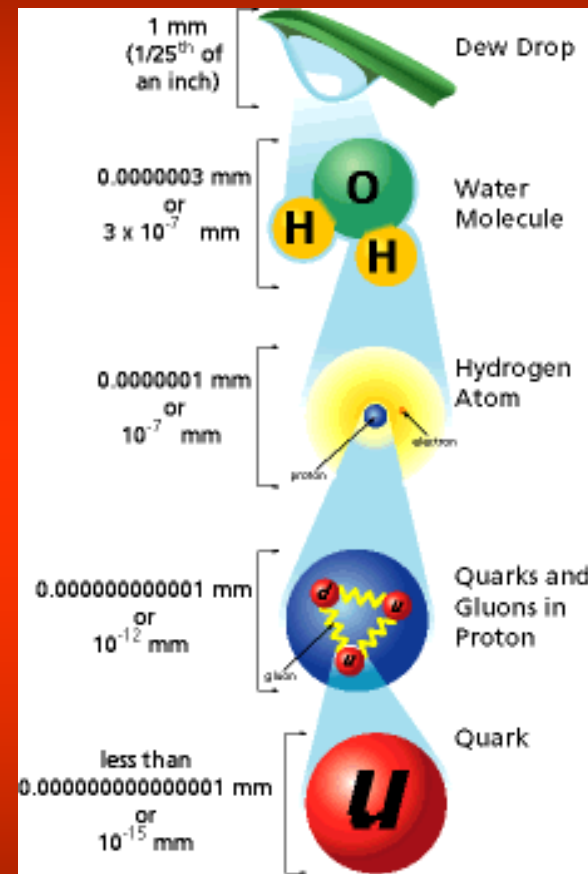
Anthony Marrett, Precision Micro Ltd

Logos machined onto a human hair (micron scale).

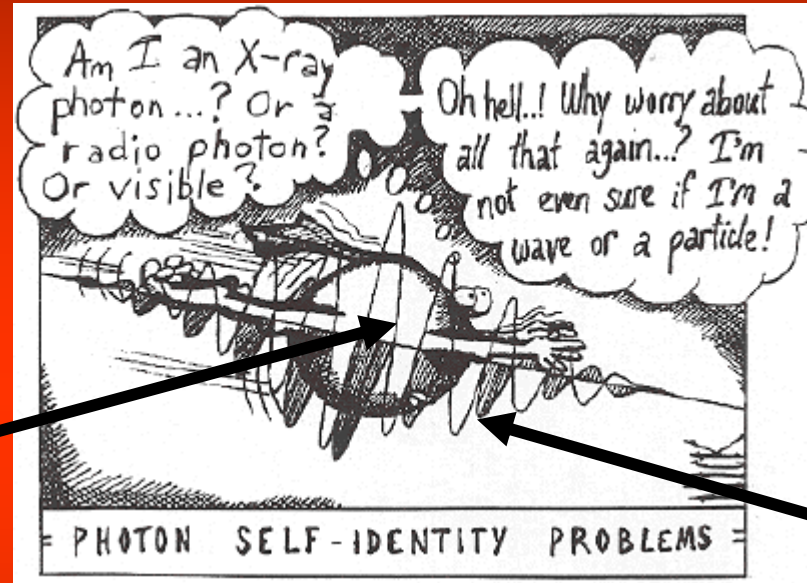


Molecule

A dew drop is made up of many **molecules** of water (billion -trillion). Each molecule is made of an oxygen atom and two hydrogen atoms (H₂O). At the start of the 20th century, atoms were the smallest known building blocks of matter.



First Discoveries



Particle

Wave

Wave-particle duality is a central concept of quantum physics. It holds that light (photon) and matter (electron, neutron, proton) exhibit properties of both wave and particle.



Molecule Energy Harvesting



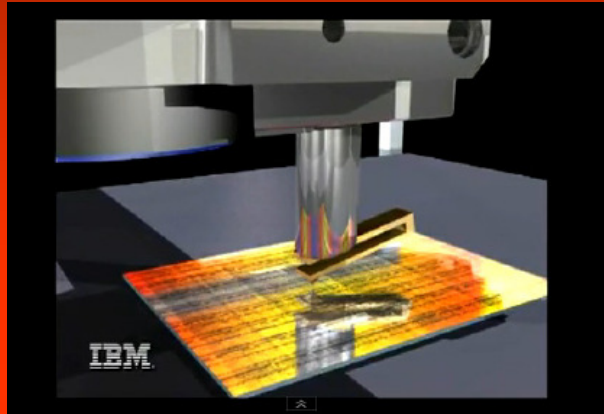
University of Pennsylvania: Penn Research Volume 9 Year 2011 Page 16

Never before had their ability to introduce an electrical response in molecules been realized. These devices harvest the light and turn it into electricity. The surprising thing is that the plasmons made this energy harvesting 20 to 1,000 times more efficient. The effect is so powerful that a device the diameter of a single human hair and few inches long could generate the same energy as a 9-volt battery. Their work, published in the journal *ACS Nano*, was supported by the Nano/Bio Interface Center, the National Science Foundation, and the U.S. Department of Energy.

<http://www.upenn.edu/researchdir/>



Moving Atoms



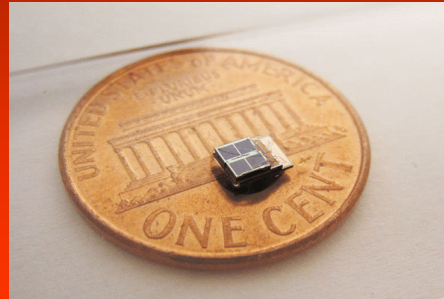
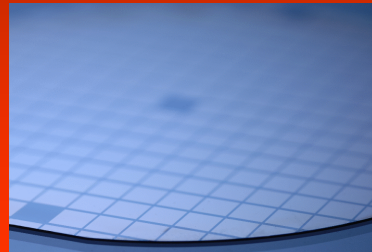
IBM scientists, in collaboration with the University of Regensburg in Germany, measured the force it takes to move individual atoms on a surface. This fundamental measurement provides important information for designing future atomic-scale devices: computer chips, miniaturized storage devices, and more. IBM Nanotechnology moves individual atoms with tuning forks for memory storage.

<http://www-03.ibm.com/press/us/en/pressrelease/23544.wss>

<http://www.youtube.com/watch?v=YcqvJI8J6Lc&feature=fvwrel>



Nanotech Power



Cymbet™ Corporation is the leader in rechargeable solid-state energy storage technology, embedded energy, backup power, and energy harvesting solutions. They are the first to market high energy density, solid state, long lived, component packaged energy storage devices in high volume for use by the electronics industry.

The solid-state energy storage technology incorporated in Cymbet in the EnerChip™ product family was originally conceptualized at Oak Ridge National Laboratory. Cymbet licensed and dramatically improved upon these concepts with the goal to bring new power solutions to the evolving nanotechnology power needs of the electronics industry.

The EnerChip solid-state energy devices are made on silicon wafers using semiconductor processes that are the core of Cymbet's PowerFab™ manufacturing process. EnerChip energy storage devices created using Cymbet's PowerFab process are radically different from typical battery devices.

<http://www.cymbet.com/>



Nanotech Government Facility

National Institute of
Standards and Technology

NIST
National Institute of
Standards and Technology

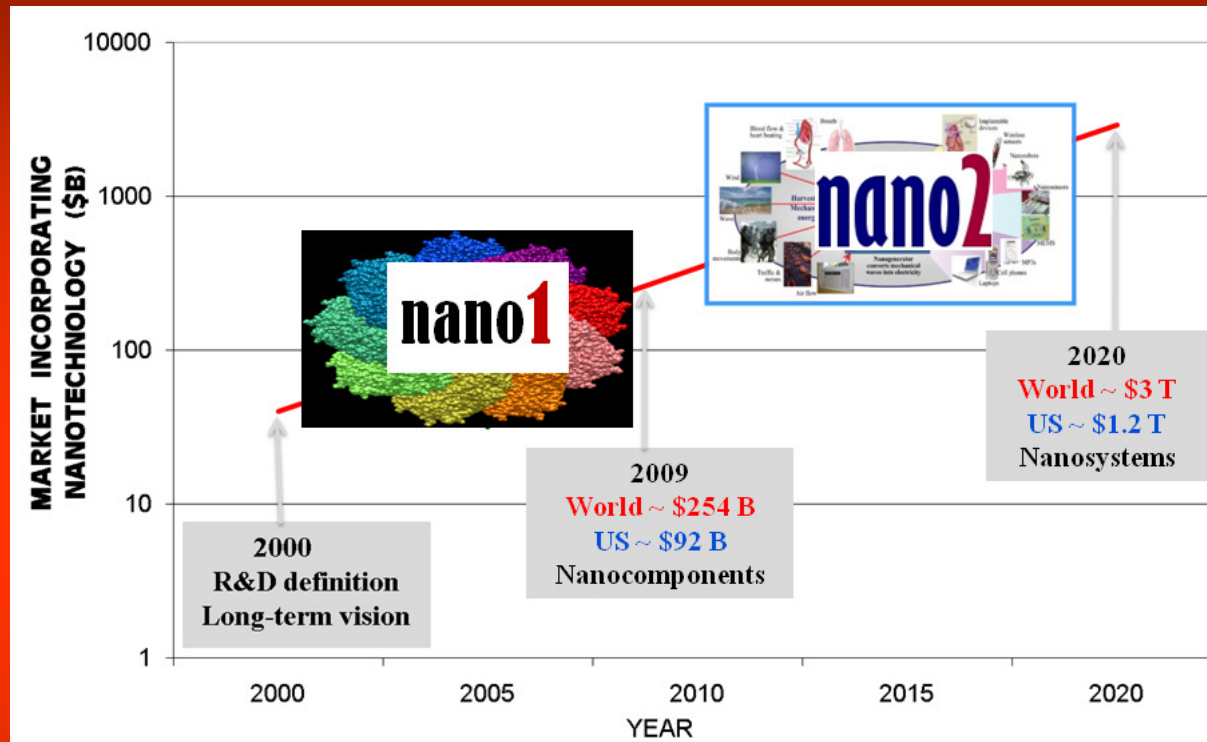


The NIST Center for Nanoscale Science and Technology (CNST) supports the U.S. nanotechnology enterprise from discovery to production by providing industry, academia, NIST, and other government agencies with access to world-class nanoscale measurement and fabrication methods and technology. The CNST is the only national nanocenter with a focus on commerce. As part of the CNST, the shared-use NanoFab gives researchers economical access to and training on a state-of-the-art tool set for cutting-edge nanotechnology development. The simple application process is designed to get researchers into the facility in a few weeks.

<http://www.nist.gov/cnst/>



Societal Needs in 2020



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http://www.wtec.org/nano2/Nanotechnology_Research_Directions_to_2020/chapter00-1a.pdf