

NANO 300 Introduction

A PSMA Education Outreach Project



The Multinational Power Electronics Association



Nanotechnology Online

- PSMA introduces a Nanotechnology course for creative application of nanotechnology.
- Targeted at college level students.
- Students can write a paper to submit new ideas for using nanotechnology competing for a cash award.

Course Availability

- NANO 300 Course is available via PSMA website at <http://psma.com> - Quicklink
- Universities associated with PSMA will get invite to participate.
- Students papers submittal instructions are in the Nano 300 Course Syllabus.

Registration and Login

- Student must register to access NANO 300
- Registration is self service, but vetted by PSMA
- Students must be enrolled in undergraduate program.

Course Syllabus

- Course Details are available via the NANO 300 course syllabus.
- Course access and syllabus info is on NANO 300 flyers available at PSMA booth and at rear of the room.

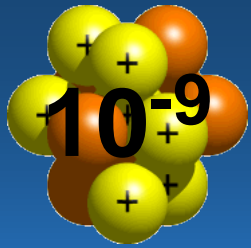


PSMA Nano 300

“a fee free nanotechnology colloquium in four sessions for engineering, science and business college students with cash awards for best papers”



- **Nanotechnology Notions**
- **Nanotechnology Science**
- **Nanotechnology Research**
- **Nanotechnology Industry**
- **Best Paper**
- **On-line discussion board**



Student Expectations

Nanotechnology is a multi discipline enabling technology.

It requires engineering, science and business disciplines to bring about its application and use.

Nano 300 Colloquium is designed for engineering, science and business college students to encourage:

1. nanotechnology education
2. apply nanotechnology to power sources within an industry
3. write a nanotechnology power sources concept paper.

Each year the Power Sources Manufacturers Association (PSMA) provides cash awards for best Concept Papers.



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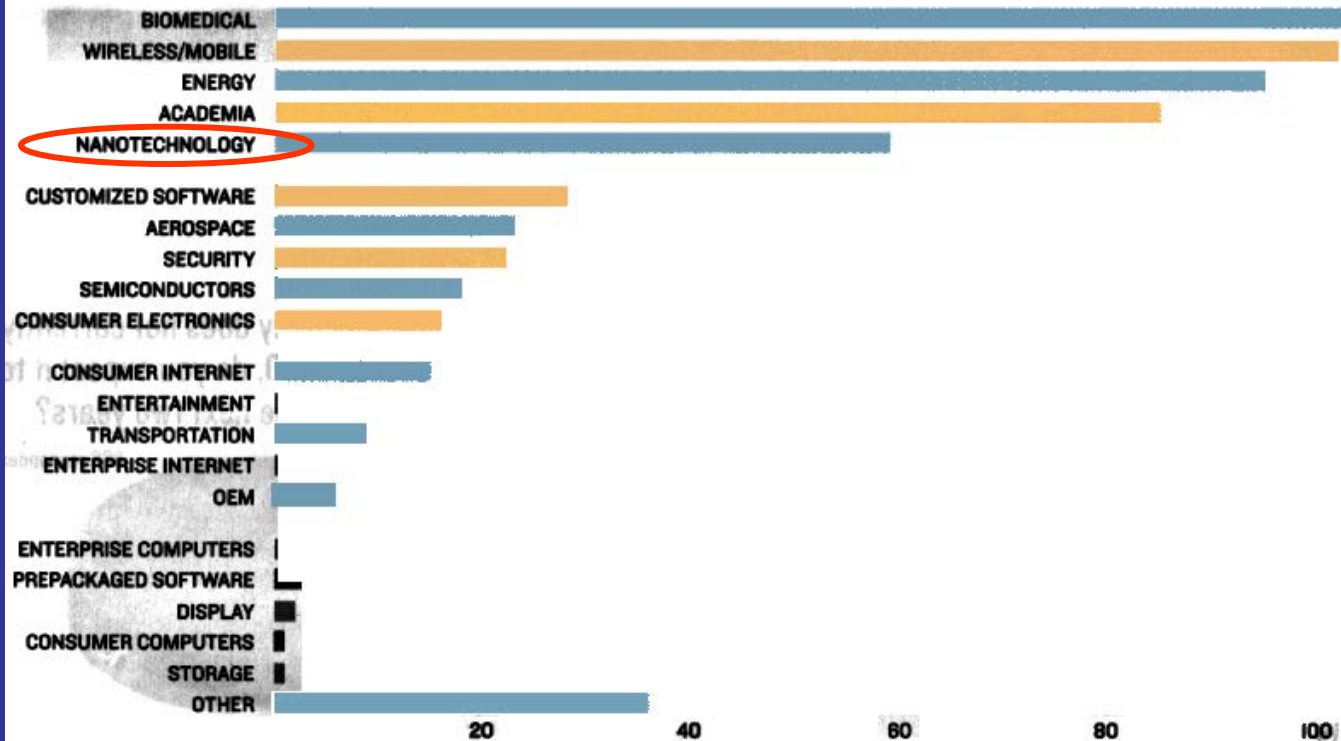
Your Best Bet for the Future

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.

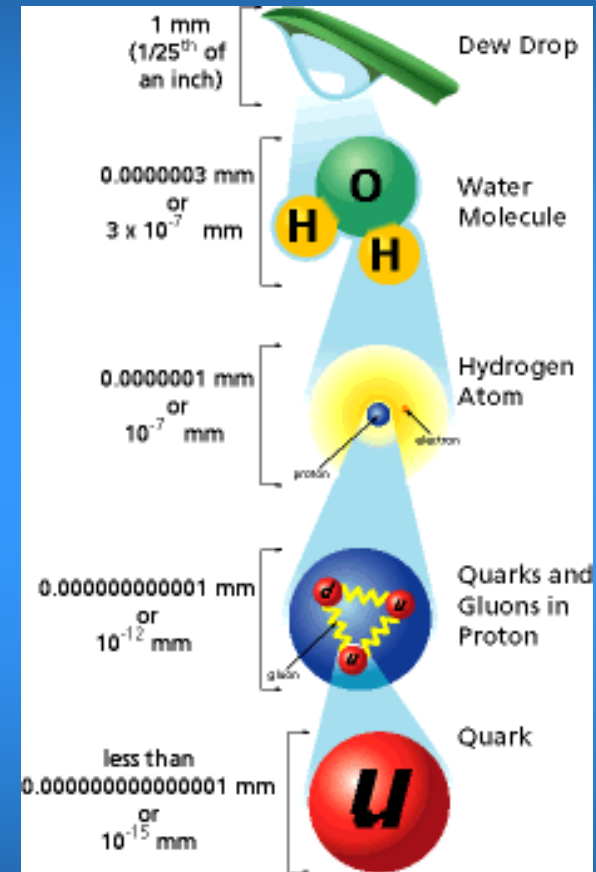
IEEE Spectrum February 2007



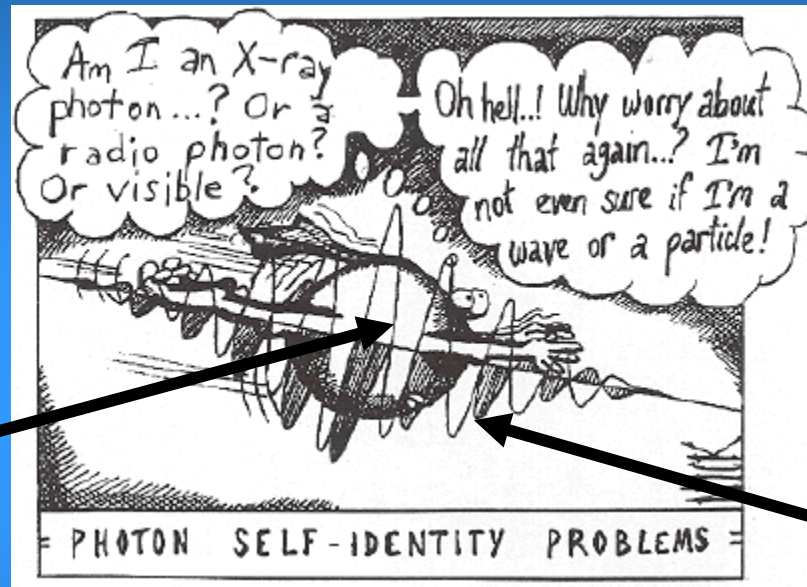
Nanotechnology keeps you ahead of the technology Power Curve.

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

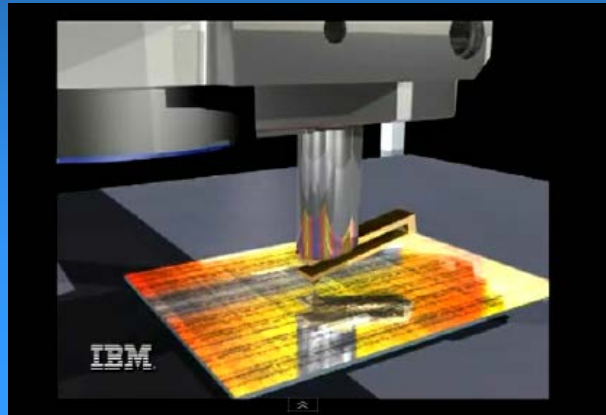


University of Pennsylvania: Penn Research Volume 9 Year 2011 Page 16

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

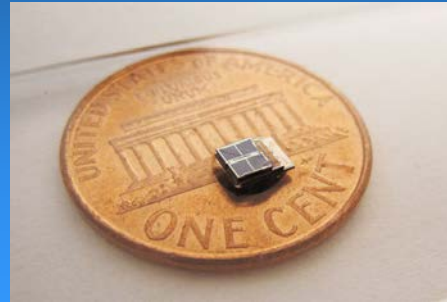
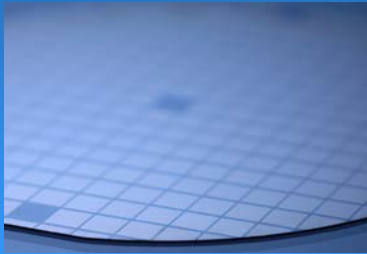


IBM scientists, in collaboration with the University of Regensburg in Germany, measured the force it takes to move individual atoms on a surface. This fundamental measurement provides important information for designing future atomic-scale devices: computer chips, miniaturized storage devices, and more.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



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/>



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Nanotech in Government

National Institute of
Standards and Technology

NIST
National Institute of
Standards and Technology



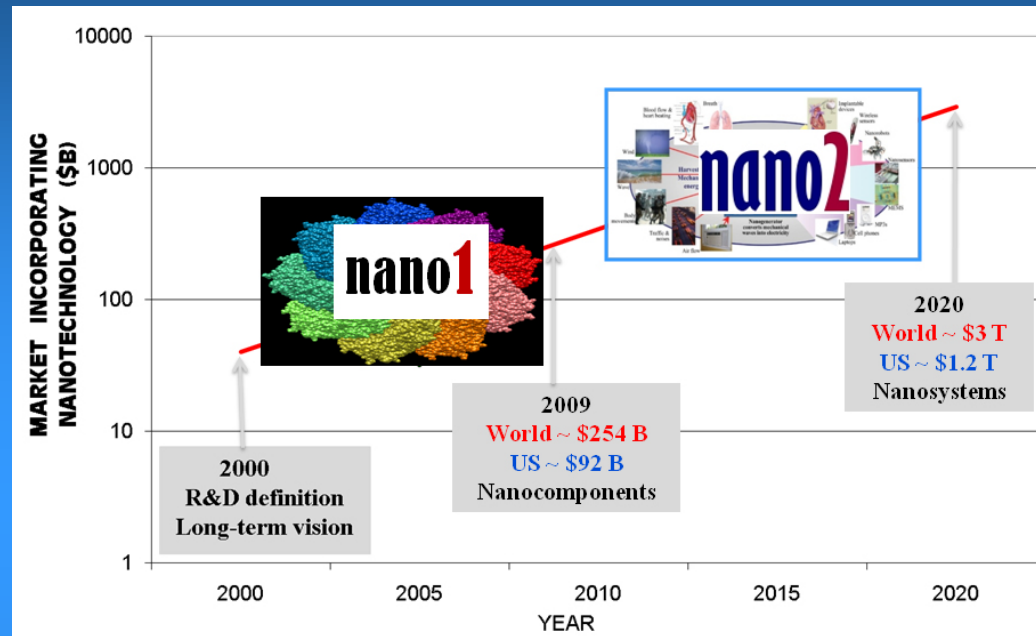
The NIST Center for Nanoscale Science and Technology (CNST) supports the U.S. nanotechnology enterprise from discovery to production by providing industry, academia, NIST, and other government agencies with access to world-class nanoscale measurement and fabrication methods and technology. The CNST is 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/>


Power Sources
Manufacturers Association

The Multinational Power Electronics Association

Prepare for Nanotechnology in 2020



**Participate in the Nanotechnology Colloquium.
Submit a concept paper !
Login on to PSMA Nano 300.
Go to: www.pσμα.com Home Page - Quick Links Corner**