

Nanotechnology Colloquium

Monday, October 6th, 2008

“NanoTxUSA’08 Conference Update”



Richard Fink, PhD
VP, Applied NanoTech, Inc

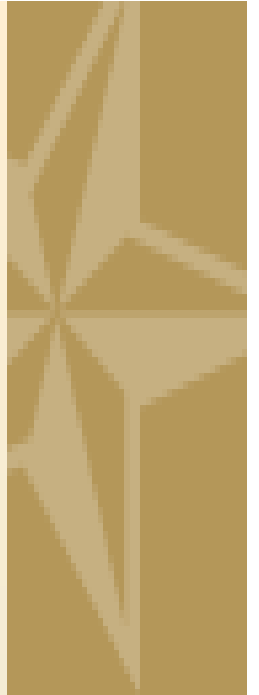
Walt Trybula, PhD

Director, NANOMATERIALS APPLICATION CENTER



Outline

- **Overview of Conference Logistic**
- **Featured Speakers**
- **Highlights from presentations**
- **Panel highlights**
- **Exhibits**



NanoTxUSA'08 Logistics

- **Located at the Dallas Hyatt Grand Regency**
- **October 2nd & 3rd, 2008**
- **Five Keynote Speakers**
- **Five technical/Business Tracks**
- **Five Panels**
- **Special Presentation**
- **Exhibitors**

NanoTxUSA'08 Logistics

- **Plenary Sessions [including meals] we held on the main level in a large room that seemed to be always nearly filled**
- **Individual technical sessions and panels were held one level down and employed all rooms in one corridor**
- **Exhibits were near the session and panel rooms**

Featured Speakers

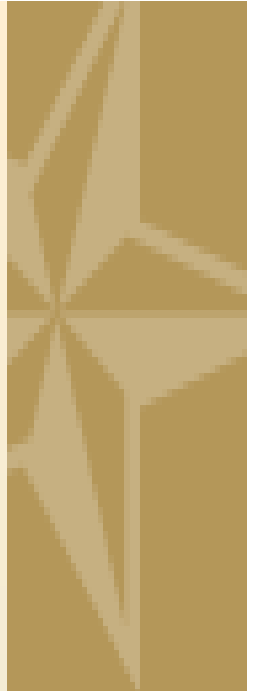
- Dr. Stanford R. Ovshinsky
- William J. Kroll [Matheson Tri Gas]
- Nicole Small [Museum of Nature & Science]
- Dan Vilenski [Israeli NNI]
- Dr. Mauricio Terrones [IPICYT]
- Dr. K. Eric Drexler [Nanorex, Inc.]

Special

- Dr. Tadasji Sasaki [International Center - Materials Research]

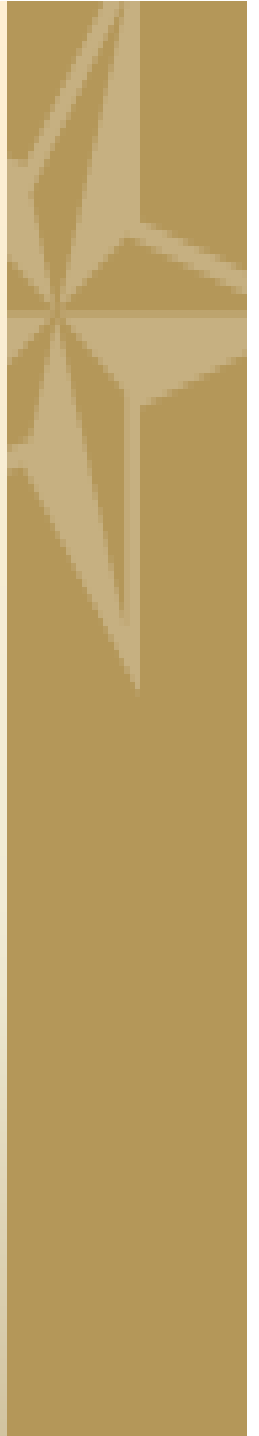
Special Award

- Pete Winstead



Highlights from Keynote (**Dr. Stanford R. Ovshinsky**)

- Bio: Inventor, developer, entrepreneur (Ni metal hydride battery, roll-to-roll photovoltaics, etc.)
- One of the most passionate presentations I have heard delivered at a nanotech conference.
- Motivated the audience on why new solutions are needed:
 - Need to regain a strong industrial footing
 - Need a cost-competitive, sustainable solutions to oil



Presentation Highlights

Selected topic:

- **Metrology [Mike Postek]**
- **Military Applications [Stanley Jacob]**
- **MEMS [Tim Dallas]**
- **Medical [Andrew Pollock]**
- **Medical [Javad Foroughi]**
- **Pharmaceutical [Morganti]**

Presentation Highlights

Selected topic: Metrology

**The Potentials of Helium Ion Microscopy
for Semiconductor Process Metrology by
Michael Postek [NIST]**

- **Accurate nanomeasurements is a critical link between scientific discovery and commercial products**
- **Without imaging and measurements at the nanometer scale, nanomanufacturing cannot succeed**

Presentation Highlights

Selected topic: Metrology

- **Both nanotechnology and nanomanufacturing require:**
 - Atomic level measurement accuracy and repeatability
 - Ability to measure desired performance attributes
 - Commercially viable production costs
 - Accurate high throughput measurements
- **Available measurement infrastructure is only evolutionary and includes:**
 - Optics
 - Scanning Electron Microscope
 - Scanning Probe Microscope
 - Transmission Electron Microscope

Presentation Highlights

Selected topic: Metrology

- **Revolutionary metrology application – Helium Ion Microscope**
- **Theoretical resolution is expected to be 0.25nm, which is 4x better than best SEMs**
- **Surface detail info is enhanced due to signal generation**
- **No surface coating required**

Presentation Highlights

Selected topic: Metrology

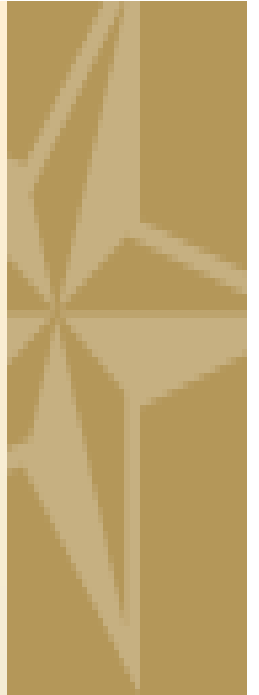
- HIM Image: IC
- Still under development
- Contamination?
- Emitter development
- Vibration issue

Field of view = 4.5 micrometers

Presentation Highlights

Selected topic: Military Applications

“Ecotoxicology of Engineered Nanomaterials” by Dr. Jacob Stanley of the US Army Engineer Research and Development Center [ERDC]

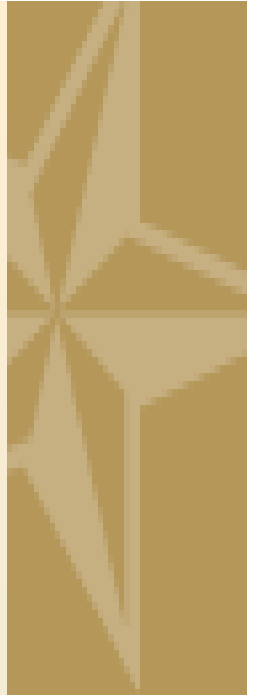


Presentation Highlights

Selected topic: Military Applications

Environmental Laboratory: Ecotoxicology and Environmental Risk Team focus

- Terrestrial
 - Endocrine Disruption in reptiles
 - Trophic transfer of metals
 - In ovo transfer of contaminants
- Aquatic Toxicology
 - Long-term exposure to explosives
 - Biomimetics of contaminant bioavailability
 - Risk and management of algal toxins
 - Risk of contaminated sediment
- Nanomaterials
 - Fate and ecotoxicology

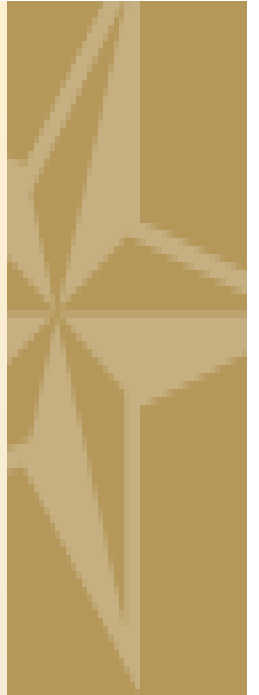


Presentation Highlights

Selected topic: Military Applications

Focus on risk assessment of nanomaterials

- Identify and quantify environmental attributes of nanomaterials.
 - Sources?
 - Fate and transport mechanisms?
 - Likely exposure scenarios?
 - Biological effects resulting from exposure?
- Provided information on the materials of interest and results from some of their efforts.



Presentation Highlights

Selected topic: MEMS

**“Dynamic MEMS” by Prof. Tim Dallas
of Texas Tech University**

- **The world of MEMS consists of Actuators, Chem./Bio Sensors, Mechanical Sensors, MicroFluidics, Micro parts, MOEMS, and RF MEMS.**
- **Dynamic MEMS Devices [DMD] are reaching into many applications.**

Presentation Highlights

Selected topic: MEMS

- **Stiction is a major problem and is**
 - *permanent or semi-permanent*
 - *bonding of two surface – very important at microscale*
- **Stiction causes**
 - *Hysteresis in part flexure/movement*
 - *Potential for failure*

Presentation Highlights

Selected topic: MEMS

- Future efforts will require additional structures and volumes to fully evaluate the causes and cures for impact.
- Packaging of DMDs will bring additional challenges

Presentation Highlights

Selected topic: Medical

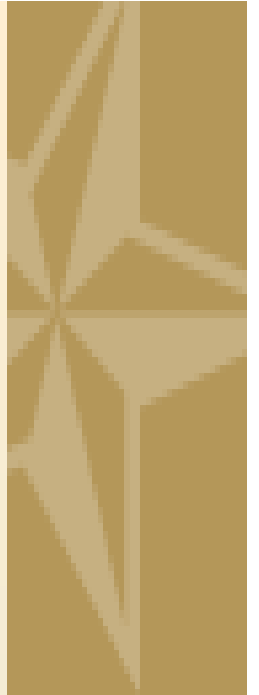
“Innovating Tomorrow’s Prosthetics through Nano-Technology” by Dr. Andrew Pollock of OrthoCare Innovations, LLC.

- Specializing in Advanced Technology designed to Mimic and Mesh with the Human Body

Presentation Highlights

Selected topic: Medical

- **bi·o·mi·met·ics**
- (bī'ō-mĭ-mĕt'ĭks, -mī-)
- The study of the structure and function of biological systems as models for the design and engineering of materials and machines.



Presentation Highlights

Selected topic: Medical

**Their focus is Integrating
Nanotechnology into Prosthetics,
and addresses:**

- **Increasing comfort and hygiene**
- **Biocompatibility**
- **MEMS**
- **Mechanical Design**
- **Coloration**
- **Materials**

Presentation Highlights

Selected topic: Medical

“A comparison of chemically prepared and electrochemically prepared polypyrrole films and fibres for artificial muscles” by Prof Javad Foroughi from University of Wollongong, Australia

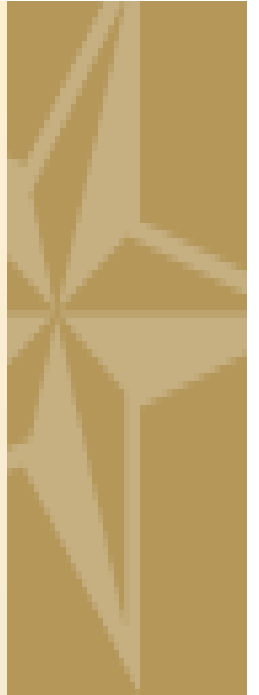
Presentation Highlights

Selected topic: Medical

Conducting Polymers :

Applications for organic conductivity
fibers/film

- In Bionics
 - Artificial muscles
 - Cell growth (eg. Nerve)
 - Drug delivery
- In Electronic Textiles
 - Sensors
 - Batteries
 - Color-change materials



Presentation Highlights

Selected topic: Medical

Development of Actuators using Polypyrrole (Ppy)

- *Why Polypyrrole?*
- *PPy has some advantages:*
 - *higher conductivity*
 - *larger actuation*
- **Have process for spinning fibers**
- **The GOAL is artificial muscles**

Presentation Highlights

Selected topic: Pharmaceutical

**“NANOSCIENCE , the challenging cosmetics
healthy food & biotextiles by Prof. Morganti,
University of Naples**

New developments in *nanoscience*, had
and will have a great future impact on
the pharmaceutical, cosmeceutical,
functional food and textile industry
worldwide.

Presentation Highlights

Selected topic: Pharmaceutical

- Innovation must be a constant process, to
 - *modify* the existing polymers,
 - *develop* new materials,
 - **evolve** the productive process,
 - **tight** cooperation with processing plants and customers,
 - **collaborate** more strictly with Research Institutes and Universities”.

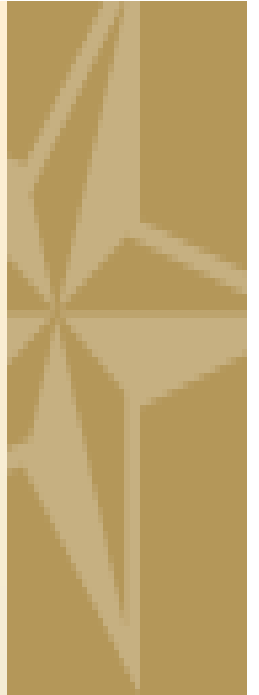
Presentation Highlights

Selected topic: Pharmaceutical

- There have been many developments in applying various types of nanomaterials to various aspects of products with the potential for significant advancements, but
- The question of what is the long term impact still remains unanswered.

Panel Highlights

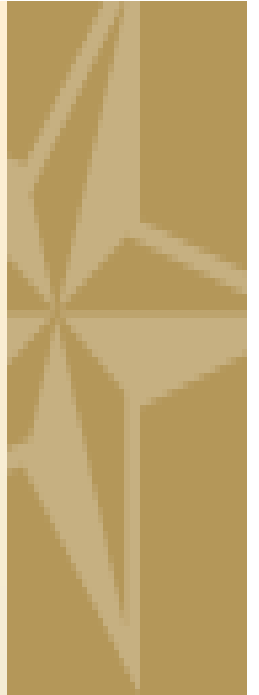
- **Investing in Nanotechnology Panel**
- **Accelerating nanotechnology Commercialization Panel**
- **Nanotechnology & Society Panel**
- **Workforce Development Panel**
- **NANO-SAFETY & Risk Management Panel**



Panel Highlights

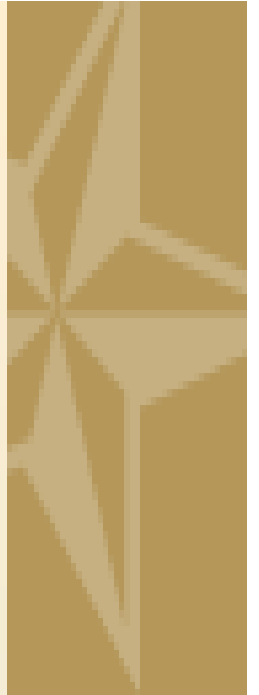
NANO-SAFETY & Risk Management Panel Members

- **Dr. Dianne Poster [NIST]**
- **Dr. Zvi Yaniv [ANI]**
- **Catherine Crago [Semicongroup]**
- **Prof. Domincik Fazarro [Sam Houston]**
- **Dr. Robert Blaunstein [Nanotech Risk Management LLC]**



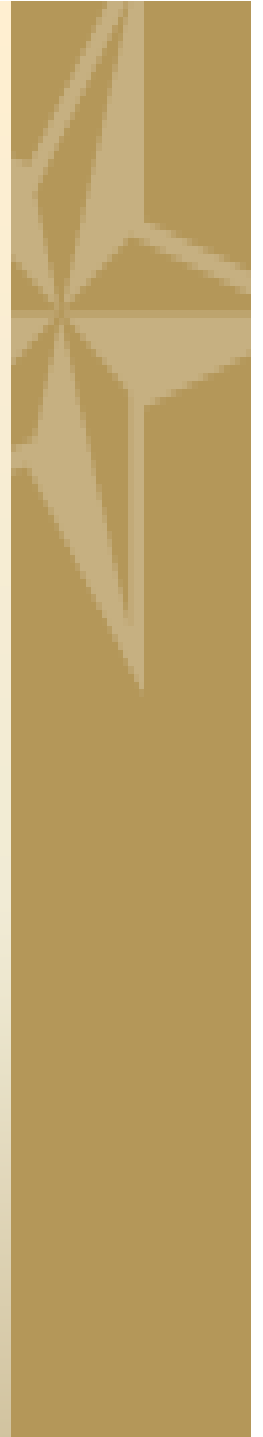
Panel Highlights

- **Key highlights of the presentations**
- **Dr. Poster provide an overview of efforts within NIST and the need for advanced metrology.**
- **Dr Yaniv discussed the efforts he is driving to ensure the safety of his workers and the environment.**
- **Ms. Crago provided insights on the cross-cultural issues that inhibit successful safety measures.**



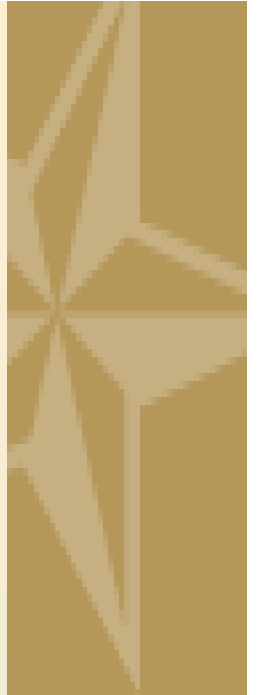
Panel Highlights

- **Key highlights of the presentations**
- **Prof. Fazarro provide an overview of the work he is doing on promoting safety within the nanotechnology educational efforts**
- **Dr Blaunstein described the risks that could be associated with the application of nanotechnology.**
- **There was some questions addressed to the panel regarding the recent exclusion of nanotechnology products from one insurer's policies.**



Exhibits

- **Exhibition Space was located near the Session Rooms**
- **Most Texas institutes represented**
- **Several instrument/equipment companies (at least two non-US)**
- **Several nanotech companies**
- **Israeli Pavilion ~ 15 companies presented with representation to more.**





Nanotechnology Colloquium

MISSION The NANOMATERIALS APPLICATION CENTER is the focal point to coordinate, facilitate and participate in nanoscience and nanoengineering applications and expedite commercialization of inventions.

To join or learn more about the NAC
www.nanotxstate.org

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