

Tuesday, May 21, 2013

7:30 a.m. Registration/Breakfast

8:30 a.m. Welcome, Introductions

9:00 a.m. **Keynote Speaker: Jim Murday**

Strategies in Nanoscale Science and Engineering Education (NSEE).

Thanks to rapid progress across many fronts, including nanoscale science and engineering, electronic teaching aides, extended careers, and the U.S. focus on STEM education, the next decade will provide compelling opportunities (and needs) to incorporate micro-nano-scale S&E into our education system. The challenge is to exploit those opportunities, with the new Federal programs projected for FY2014 at NSF and the Department of Education providing some new mechanisms and funding.

10:15 a.m. **Break**

10:30 a.m. **Focus on students: The Stories of 4 Program Graduates**

11:40 a.m. **Buffet lunch and small group discussion: Student Recruitment & Retention**

At Hotel

Parallel Session 1

1:00 p.m. – 1:35 p.m.

Cardinal Perch Using Nanotechnology Based Activities to Teach Critical Thinking Skills

Deb Newberry Nano-Link

Critical thinking is an attribute that is important to many employers. Nanoscience offers many opportunities to teach these skills to students. The session will lead participants through two hands on activities that have been used to teach not only nanoscale concepts but also critical thinking skills.

Eagles Nest Nanoizing Material Science

Kim Grady & Mel Cossett MatEd

MatEd developed a strategy for infusing nano concepts into its existing material science modules. By taking the Big Idea – Concept approach, we were able to narrow in on the “teachable” things, the concepts worth exploring and discovering how material properties change at the nano scale. We have infused nano in to three core MST modules and will demonstrate those via a dynamic learning platform. A tutorial for using this strategy will be provided.

Hawks Ridge What’s “Nano” About it?

Michael Lesiecki MATEC

This hands-on activity guides student teams to investigate products containing nanotechnology materials or features. The teams are then challenged to create a 30-60 second infomercial addressing these three questions: What Is The Problem? What Is The Solution? How Does Nanotechnology Make It Superior? This activity helps students make the connections to the real world and strengthens their teamwork and presentation skills. Alignment to standards will be discussed as part of the presentation.

Parallel Session 2

1:40 p.m. – 2:15 p.m.

Cardinal Perch An Affordable Demonstration Kit for Nano Scale Pattern Transfer

Wook Jun Nam NACK

Nano-imprint lithography is considered one of the candidates of the next generation nano-scale pattern transferring techniques. However, it is very expensive for a hands-on demonstration since it needs special facilities, tools, and materials. A simple and affordable demonstration kit for the technique has been developed by NACK, and the details about the kit and its capabilities will be introduced and discussed in the presentation.

Eagles Nest Nanotech Safety Education, the Beginnings

Walt Trybula Texas State University

Nanotechnology Safety is a topic that is being raised more often. The education of people in the proper procedures and methodology for adequately controlling nanomaterials has been lacking due to not having a concerted effort in establishing the educational fundamentals. This presentation covers the history of collaborative universities' efforts that have led to the current development of two courses that are addressing these needs. The first course will be offered Summer 2013.

Hawks Ridge Geek's Night out

Rich Vaughn Rio Salado College

Rio Salado College partnered with Arizona State University and the NACK center to host a booth during Geek's Night Out, a part of the Arizona SciTech Festival. Using a 4G cell phone and portable computer equipment, participants remotely accessed and imaged micro and nanoscale structures with a Scanning Electron Microscope. See some pictures and learn about the other hands-on activities to bring Nano to a massive community event.

Parallel Session 3

2:20 p.m. – 2:55 p.m.

Cardinal Perch Nanotechnology: Demos and Simulations

Michael Lesiecki MATEC

Help students grasp concepts in nanotechnology through multimedia animations, interactive activities, videos and simulations.

Eagles Nest Engaging Micro and Nanotechnology Students in Career Development Activities

Catherine Basl SHINE

How does a micro or nanotechnology program provide quality career development activities without a career specialist in the department? In this session participants will learn three career development essentials students will need, resources and partnerships to meet those needs, and tips for building career development into your micro or nanotechnology program—all as a non-career professional.

Hawks Ridge Nanotechnology: It May be Small, but it's a BIG Hit with High School Students

Melissa Baker Newport High School

With the help of the SHINE Program (Seattle's Hub for Industry Driven Nanotechnology Education), a semester long nanotechnology high school class was developed and offered to students for the 2012-13 school year in Bellevue Washington. The interest level was enormous! In this session you will see how the class is organized and how it benefits not only the students, but also the local industry as well.

Voice of Industry and Program Alumni

3:00 pm. -3:45 p.m.

Cardinal Perch Biotechnology and Micro/NanoScale Skills: Industry Perspective: —Quality Control in a Medical Device Company

Vincent Ijioma

Parallel Session 4

3:50 p.m. – 4:30 p.m.

Cardinal Perch A Visual Approach to Nanotech Education

Charles Xie Concord Consortium

In this presentation, we will show how five types of mathematical models can be used to generate visual, interactive simulations that provide a powerful software environment for virtual experimentation. The nanotechnology content areas covered by this approach and a variety of instructional strategies for effective use of these simulations will be discussed.

Eagles Nest A Source for Biotechnology Educational Content

Lisa Seidman Bio-Link

Bio-Link is a NSF-funded center of excellence that serves the biotechnology technician education community. This session will demonstrate some of Bio-Link's newest resources for biotechnology instruction and career advising including "courses-in-a-box" and an interactive career site. We will also venture into the dangerous and "hot" topic of "credentialing" -- where is Bio-Link in the credentialing spectrum, where are we heading, and how did we get here?

Hawks Ridge Model of Successful STEM Early College High School—Creating a Workforce for the Future

Laurel Logan-King, Diane Irwin Ballston Spa Central School District

The Clean Technologies & Sustainable Industries ECHS is a collaborative early college program rooted in STEM. The program prepares students to be college and career ready through collaborations between K-12, Higher Education and Industry. Partnerships include: NYSERDA, Hudson Valley Community College, and NEATEC.

Parallel Session 5

4:30 p.m. – 5:10 p.m.

Cardinal Perch An Introduction to nanoHUB.org for Educators

Tanya Faltens Purdue University

nanoHUB.org is a free online resource and community for nano educators and researchers that contains over 3000 multimedia resources including simulation tools, learning modules, online lectures and courses, podcasts, and homework assignments. This tutorial will introduce you to nanoHUB.org, taking you on a guided tour through the main content areas, and illustrating the use of simulation tools to introduce nano concepts in chemistry, physics, electronics and materials-related courses.

Eagles Nest Dual Encounter: Applications of Nanotechnology in Medicine and Health and Challenges of Incorporation in Biology Curriculum at Community Colleges

Vimlarani Chopra Houston Community College

Majority of healthcare is reactive rather than preventative. Avoiding the manifestation of illnesses is becoming a major priority in medicine. Nanotechnology will contribute to this through providing more effective monitoring of individuals' health and more understanding of the genetic make-up of the patients. Forthcoming progress in nanotechnology is dependent on able workforce needed to accomplish these goals in coming decades coming out through Community Colleges.

Hawks Ridge Enhancement of a Sunscreen NanoParticle Lab

Maajida Murdock Coppin State University

Shielding yeast from UV radiation experiment explores the effects of genetic changes of yeast cells exposed to the space environment. Yeast contains genes for DNA repair that are very similar to human genes. In this experiment, students will explore how shielding countermeasures can help to lessen the harmful effects of UV radiation. The students use ordinary baker's yeast as a model system to explore the effects of radiation on cells. They then test several kinds of sunscreen with and without nanoparticles (each with different SPF). The results from this experiment will help students to discover which sunscreens protect the yeast cells better than others.

Evening Dinner at the Science Museum of MN – Plus IMAX – Tornado Alley

Bus Departs at: 5:30pm

Returns at: 10:00pm

Wednesday, May 22, 2013

7:30 a.m. Registration/Breakfast

8:30 a.m. **Keynote speaker: Paul Gourley**

Nanophotonics of Harvesting Energy on a Solar Micro-Farm

I will discuss some of the underlying physics of plant nanophotonics that inspire novel paradigms for synthetic sunlight conversion.

10:00 a.m. Break

Voice of Industry and Program Alumni

10:30 a.m. Photonics and Micro/NanoScale Skills: Industry Perspective
Internships: Not always paid at a start up {photonics} company

11:20 a.m. Small group discussions – Issues, Solutions, Approaches
Working with Industry, Working with Administration, Student Research

12:30 p.m. Lunch and group report out

1:15 p.m. **Keynote Speaker: Walt Trybula**

To Infinity-1 and Beyond!

Nanotechnology is driving everything smaller. First, we will consider some of the consequences of smaller sizes on what is historical understanding. Next, we will review some of the interesting nanomaterials findings and how they are creating new worlds, but there are limits to them. The application of nanotechnology to a segment of the energy industry will be employed to demonstrate how technology can be successfully applied at scales unimagined as few as ten years ago.

Parallel Session 6

2:30 p.m. – 3:05 p.m. at Hotel

Cardinal Perch All Models are Wrong: Salt and Water

Deb Newberry Nano-Link

Textbook drawings, physical models and computer simulations serve as extremely useful tools for students of all ages and in all disciplines. Often, these tools supplement textual descriptions and support student understanding. However, no drawing, model or simulation is ever 100% accurate. Certain assumptions, simplifications and modifications of the “real” system have to be made in order to meet dimensional, computational and cost constraints. It is critical that educators and students understand the inherent and often covert assumptions or simplifications in these tools especially when studying or working at understanding the micro and nanoscale. This session will discuss some of the assumptions and potential consequences.

Eagles Nest Nanotechnology Certification at NTC

Frank Ferandes & Rich Wilkosz North Central Tech College

This sessions would discuss the implementation of "The Nanotechnology Certificate" at Northcentral Technical College (NTC). We would be sharing best practices on the course work that we adopted from our Nano-Link partners, our hands on laboratories and a capstone project that students complete in conjunction with a specific business or industry through an internship.

Parallel Session 7

3:10p.m. – 3:45p.m. at Hotel

Cardinal Perch Development and Implementation of a Comprehensive Nanoeducation Program

Joyce Palmer (Joyce Allen) Georgia Tech

The National Nanotechnology Infrastructure Network is a NSF-funded program of fourteen universities which provide state-of-the-art nanotechnology facilities, support, and resources. NNIN has a large and integrated education and outreach program which helps to develop a workforce, ready for the demands of nanotechnology, as well as develop a nanoliterate public. This presentation will share programs that have been developed to meet the needs of this K-gray continuum.

Eagles Nest An Immersion Semester in Nanotechnology

Sam Agdasi Ivy Tech Community College

In this presentation an overview of nanotechnology program at Ivy Tech Community College will be provided. Partnership with universities to build the program will be discussed. The development of a nanotechnology laboratory at Ivy Tech, and partnership with industry are other topics in the presentation. Then, the rationale for offering an immersion semester in nanotechnology will be provided, and finally the best practices for building a nanotechnology program will shared.

Hawks Ridge Statistical Process Control – Why we need it and How to use it – Part 1

Barbara Lopez SCME, April Lujan SCME

This workshop will answer the questions "What is Statistical Process Control (SPC)?" and "Why is it important to high tech manufacturing of micro and nano-systems?"

Parallel Session 8

3:50p.m. – 4:25p.m. at Hotel

Hawks Ridge Statistical Process Control – Why we need it and How to use it – Part 2

Barbara Lopez SCME, April Lujan SCME

A continuation of session 7 - This workshop will answer the questions "What is Statistical Process Control (SPC)?" and "Why is it important to high tech manufacturing of micro and nano-systems?"

2:30 p.m. Bus Departs to DCTC

Parallel Session 9

3:00 p.m. – 4:30 p.m. **at DCTC**

Room 1 - 303 Citrus Pulp and Its Many Educational Uses

Kurt Carlson Nano-Link CVTC

Water binding citrus fibers are a natural way to increase moisture and decrease calories in your favorite muffin. After a brief explanation of the discovery and development of these super hydro-colloids, students will explore the fibers' properties with a hands-on demonstration of their ability to lock up H₂O. Then all will examine the fibers' structure with Dakota County Technical College's scanning electron microscope (SEM). Attendees should bring a flash drive to save their SEM images.

Room 1 - 305 Micro-contact Printing

Maureen Devery SHINE

In this hands-on presentation, participants will perform a lab using soft lithography in order to microcontact print images onto a thin film. Participants will learn about the science behind the lab and tips they can use to bring this lab into their classroom.

4:30 p.m. Return to Hotel from DCTC

5:00 p.m. – 5:20 p.m. 90 Sec lightening round overview—posters and exhibits

5:20 p.m. Poster Session – in ballroom, Exhibits- in foyer, Dinner- in ballroom

Thursday, May 23, 2013

6:30 a.m.-7:30 a.m. Registration/Breakfast

7:30 a.m. Bus departs to DCTC

Parallel Session 10

8:00 a.m. – 9:30 a.m. **at DCTC**

Room 1-305 Hands-on classroom kit – Micro/Nano Circuit Lift-Off and Crystal Silicon Etching

Barbara Lopez SCME, April Lujan SCME

This lab experience will familiarize the participants with the process steps involved in making a micro-pressure sensor. We will then perform and observe the lift-off and anisotropic etch process steps. The lift-off step ultimately forms the sensing circuit of the pressure sensor and the anisotropic etch step etches the bulk of the silicon away, creating the reference chamber for the micro-pressure sensor.

Room 1-303 Additive manufacturing and nanotechnology applications

Mrunalini Pattarkine Harrisburg University

The workshop will introduce the participants to the latest in the field of 3D printing and nanolithography. The intent of this workshop is to give a 360-degree overview of this cutting edge field and highlight its applications across a broad-spectrum of applications spanning electronics to tissue engineering. Includes an appropriate hands-on activity, as well as a brainstorming session.

Parallel Session 11

9:30 a.m. –11:00 a.m. **at DCTC**

Room 1 - 305 Hands-On Classroom Kit- High Aspect Ratio Micro/Nano Lithography and Electroplating

Barbara Lopez SCME, April Lujan SCME

LIGA is a micro-technology fabrication method that yields micro-sized components and devices with a high aspect ratio. This workshop will demonstrate the SCME LIGA Simulation kit. The kit utilizes solar printing plates and a black-light to simulate the LIGA process steps allowing the participants to observe the lithography and electroplating process steps. Here, chemistry and physics are used to teach the cutting edge fabrication methods of microsystems devices.

Room 1 -303 Making a Big Deal Out of Everyday Little Things

Kristi Jean Nano-Link NDSCS

Hands-on lab experiments that explore everyday items and zooms in to understand what happens on a smaller scale. Using a burnt out light bulb, an electron microscope will be used to explore crystals. The resulting tungsten crystals intrigue students and provide motivation to learn more about crystal structures. From diapers to gummy goo, your students will be engaged!

11:00 a.m. Return to Hotel

Parallel Session 12

8:00 a.m. – 8:40 a.m. **at Hotel**

Cardinal Perch Hands-On Classroom Kit- Rainbow Wafer – Math, Physics, Optics, Chemistry in Micro/Nano Machining

Matt Pleil SCME

Participants will be introduced to the SCME Rainbow Wafer kit. Teach your students not only about thin film interference in a fun way, but also about how oxide is deposited, etched, and how these STEM concepts are applied in industry.

Eagles Nest A Traveling AFM Part 1

Abe Michelen NEATEC

Parallel Session 13

8:40 a.m. – 9:20 a.m. **at Hotel**

Cardinal Perch Harnessing the Power of Partnerships and Technology in Nanoscience Education

John Ristvey MCREL

The purpose of NanoExperiences is to develop and evaluate an out-of-school-time (OST) program that combines academic learning in emerging STEM content with additional supports—setting high expectations, building background knowledge, and motivating students—to prepare high school Career and Technical Education (CTE) students for postsecondary learning and credentials leading to participation in the STEM workforce.

Eagles Nest A Traveling AFM Part 2

Abe Michelen NEATEC

Parallel Session 14

9:20 a.m. – 10:00 a.m. at Hotel

Cardinal Perch Photonics and Nano – A Match Made in Heaven

Feng Zhou OP TEC

OP TEC, a national center, has created a significant number of educational units and courses. This session will review and cover content directly associated with micro and nano technologies.

Eagles Nest How do we see what we can't see? Free content and lab modules available for teaching the microscopes that enable nanotechnology

Diane P. Hickey-Davis, Ph.D

We all love the images of enlarged bug parts (is that a fly's eye?), digital media (so that's how a CD works!) and even atoms (seen the IBM movie "A Boy and His Atom"?). But how do we get those images? Microscopes, of course! This session will match various microscopes to "The Scale of Things" (DOE image), and explain where to get the free content available to teach these instruments - whether you have access to the instruments or not!

Parallel Session 15

10:00 a.m. – 10:40 at Hotel

Cardinal Perch Diffraction Gratings: Micro and Nano

Deb Newberry Nano-Link

Diffraction gratings have had many applications over centuries. Recently diffraction gratings have been used to detect the present of proteins or other biological entities. This session will discuss some of the various methods for students to create diffraction gratings and using PDMS, participants will work with a macro level grating to evaluate the multiple concepts that can be taught using this material.

Eagles Nest Jell-O Lab on a Chip

Maureen Devery SHINE

Hands-on, inexpensive fluid mechanics activity will be demonstrated

11:30 Wrap-Up Keynote

12:30 p.m. Summary and Evaluations

12:45 pick up box lunches and adjourn