

Welcome to MATEC NetWorks Webinar

Nanotechnology in the Classroom Laboratory

NetWorks is an NSF-funded ATE Resource Center supporting faculty in Semiconductor, Automated Manufacturing, and Electronics education

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COMMUNITY
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NetWorks is a part of MATEC, a member of
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at the
Maricopa Community Colleges.



National
Science
Foundation

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National Science Foundation.
DUE-0501626



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NetWorks Webinar Team

Mark Viquesney



Webinar Host

Lara Smith



Marketing & Management
Support

Darlene Cieplinski



Administrative Support

Shay Johnson



Technical Support



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Poll

Participants

Mark Viquesney (Moderator, Me)

1 Participant

Raise hand/smile/clap

Chat

Show All

Joined on February 25, 2009 at 1:08 PM

Chat

Send to This Room

Audio

Microphone Speaker

Ctrl+F2

Whiteboard - Main Room

15/29 Welcome to MATEC NetWorks Webinar ☒ Follow Moderator ☐ Roam



Welcome to MATEC NetWorks Webinar

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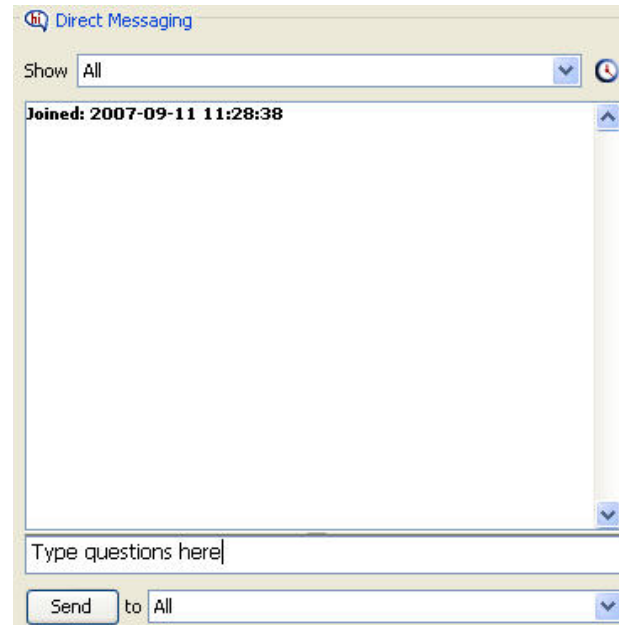


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Chat Box

- If you are listening by phone, please mute your phone by pressing #5.
- If you have questions during the presentation, please submit them in the **Chat Window** and Send to "All" so that others can follow along. 
- Throughout the presentation and at the end of the session we will answer as many questions as we can.

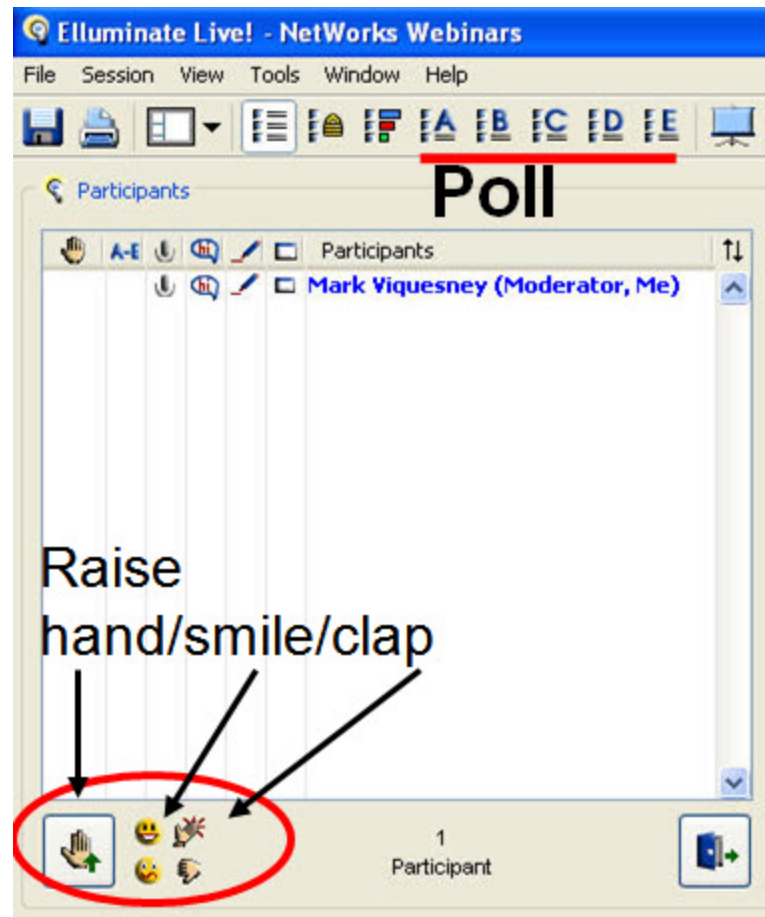


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Participants Box

- Allows you to respond to the presenter's comments.



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NetWorks Webinar Presenters



Amy Brunner
Research Associate
Center for Nanotechnology
Education and Utilization (CNEU)
Nanotechnology Applications and
Career Knowledge (NACK) Center
The Pennsylvania State University



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Nanotechnology in the Classroom Laboratory



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Outline of Today's Talk

- Review of Nanotechnology



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Outline of Today's Talk

- Review of Nanotechnology
- Nano4me website



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Outline of Today's Talk

- Review of Nanotechnology
- Nano4me website
- What is Remote Access



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What is Remote Access

- A. Having the ability to travel to distant locations
- B. Watching a recorded on-line lecture by a leading authority on line
- C. Gaining operational control of high tech equipment via an internet connection
- D. A way to change the channels on a television



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Outline of Today's Talk

- Review of Nanotechnology
- Nano4me website
- What is Remote Access



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Outline of Today's Talk

- Review of Nanotechnology
- Nano4me website
- What is Remote Access
- Tools Available for Remote Access



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Outline of Today's Talk

- Review of Nanotechnology
- Nano4me website
- What is Remote Access
- Tools Available for Remote Access
- Example of Remote Activity



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Outline of Today's Talk

- Review of Nanotechnology
- Nano4me website
- What is Remote Access
- Tools Available for Remote Access
- Example of Remote Activity
- Remote Demonstration

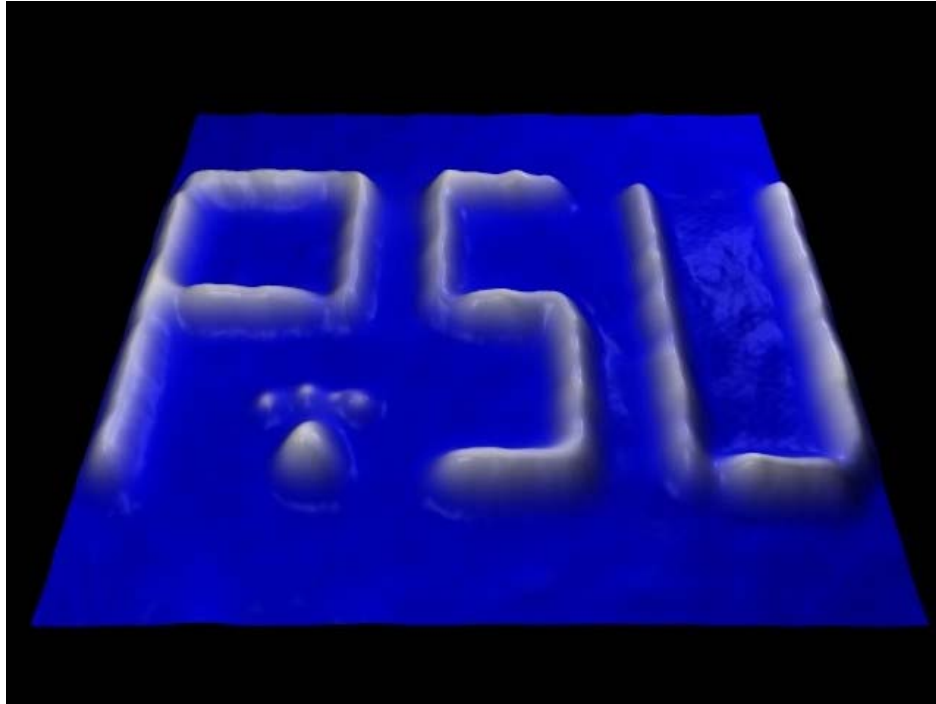


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Nanotechnology

Nanotechnology is manipulating matter at the atomic and molecular scale.



Courtesy Sykes, Fernández, Nanayakkara, Mantooth, Nevin, and Weiss

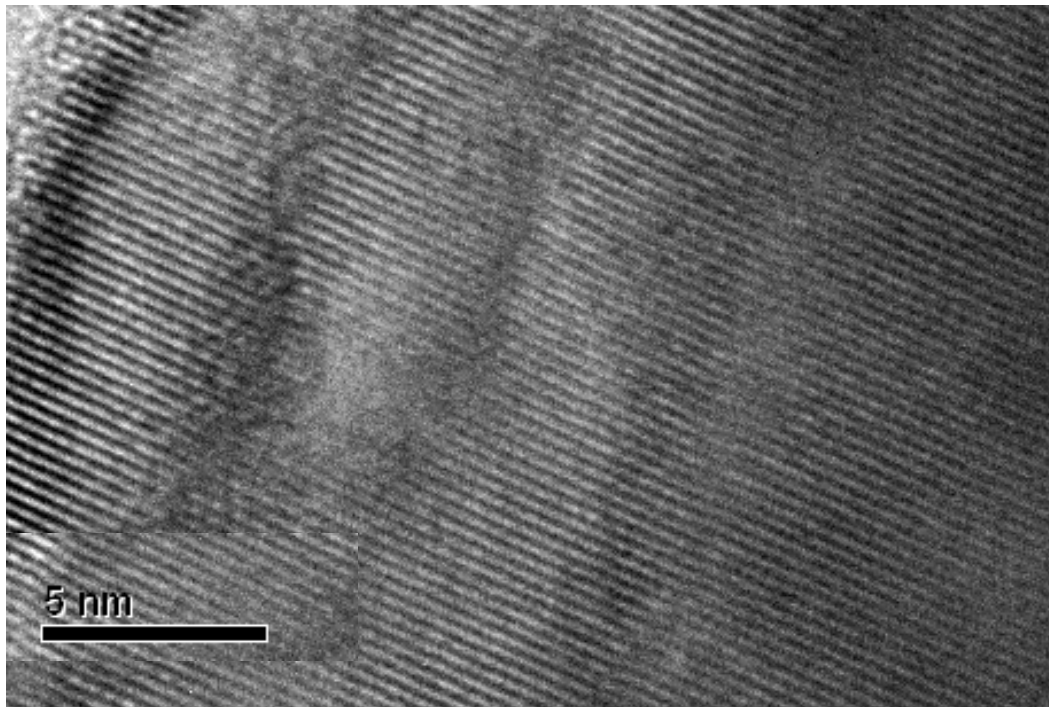


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Nanotechnology

Nanotechnology is “seeing” matter at the atomic and molecular scale.



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Nanotechnology

Nanotechnology is exploitation of the unique capabilities/properties of structures fabricated at the atomic and molecular scale.



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Nanotechnology

- Nanotechnology is interdisciplinary



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Nanotechnology

- Nanotechnology is interdisciplinary
- Few have training



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Nanotechnology

- Nanotechnology is interdisciplinary
- Few have training
- Lots of Industries impacted



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Nanotechnology

- Microfabrication versus Nanofabrication



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Nanotechnology

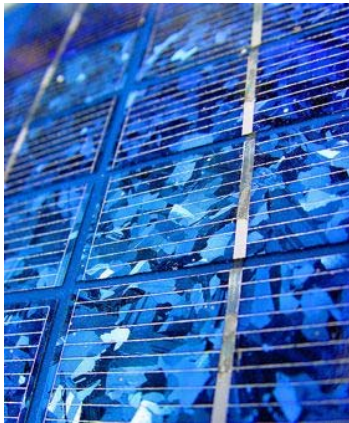
- Microfabrication versus Nanofabrication
- The major differences:
 - dimensions of the components
 - alternative fabrication techniques
 - new phenomenon



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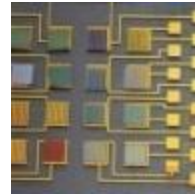
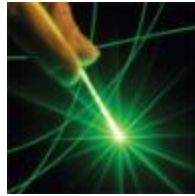
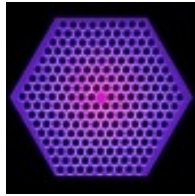
Nanotechnology



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What fields are impacted?



- Pharmaceuticals
- Chemistry
- Biotechnology
- Medicine
- Bio-Nanotechnology
- Biomimetics
- Microelectromechanical Devices (MEMs)
- Optics/Photonics
- Sensors
- Water Purification
- Food

- Information Technology Management
- Forensics
- Microelectronics
- Forestry
- Environmental Studies
- Agriculture
- Bio-based Materials
- Automotive
- Construction Materials
- Advanced Manufacturing
- Security
- Textiles



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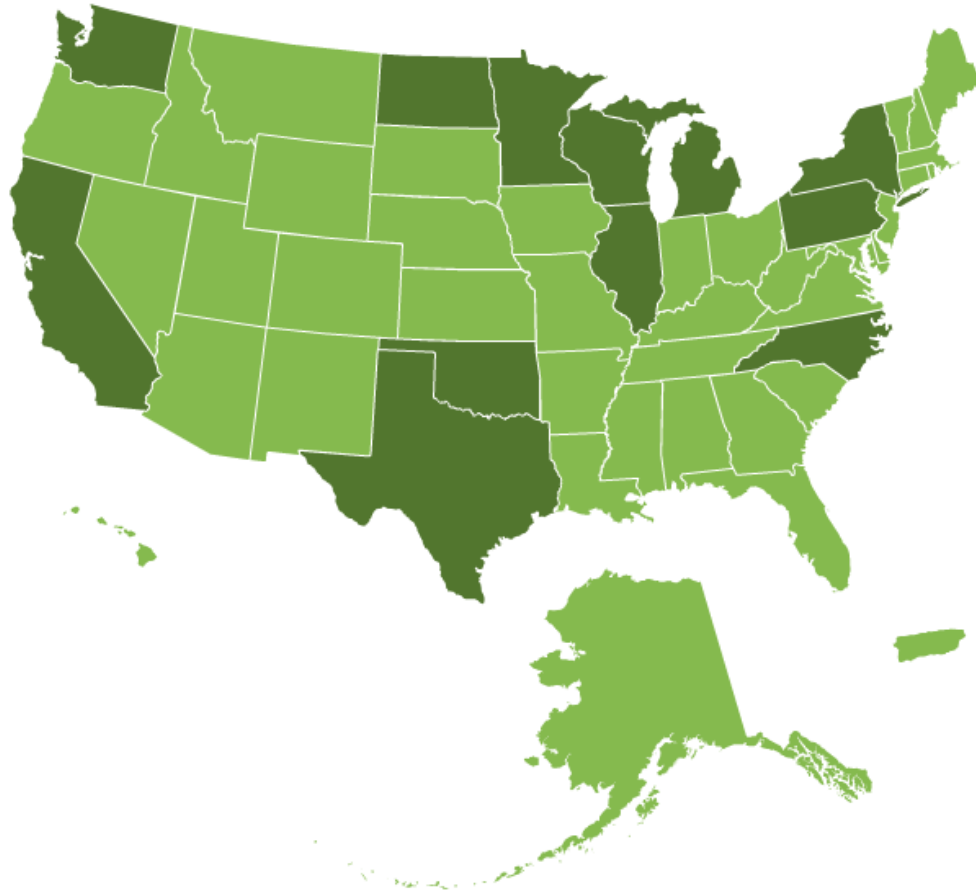
Questions?



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Associate Level Training Programs in Nanofabrication



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www.nano4me.org

The screenshot shows the Nano4Me website (www.nano4me.org) displayed in a Mozilla Firefox browser window. The browser's address bar shows the URL <http://nano4me.org/educators.html#contenttop>. The website's header includes the title "Nanotechnology Educational Resources | NACK Center - Mozilla Firefox" and a navigation menu with "File", "Edit", "View", "History", "Bookmarks", "Tools", and "Help". Below the browser window, a taskbar shows several open applications: "Start", "MATEC - Microsoft Word", "Microsoft PowerPoint - [...]", and "Mozilla Firefox Start Pag...". The website itself features a blue and white color scheme. On the left, a sidebar contains links for "Students", "Educators", and "Industry" under the heading "The path you take could change the world:", and links for "Submit Program or Resources" and "Submit Upcoming Workshop" under "Contribute to this site:". The main content area has a heading "Stay informed. Find resources across the country." followed by buttons for "Access NACK RESOURCES", "Attend WORKSHOPS", "Access TOOLS", "Recruit STUDENTS", and "Attend WEBINARS". Below this, there are sections for "The NACK commitment", "Available Resources", and "Post-Secondary Resources". The "Post-Secondary Resources" section includes "Introductory Level Modules", "Undergraduate Level Course Notes", and "Undergraduate Level Laboratories". A blue button labeled "CLICK HERE TO ACCESS RESOURCES" with a "View/Download" link is also present. At the bottom of the page, there are three small images: a person in a lab coat, a laboratory setting, and a close-up of a microchip.

Nanotechnology Educational Resources | NACK Center - Mozilla Firefox

File Edit View History Bookmarks Tools Help

<http://nano4me.org/educators.html#contenttop>

Most Visited Getting Started Latest Headlines

Nanotechnology Educational Resour...

The path you take could change the world:

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[Industry >](#)

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[About Nano4Me >](#)

[About NACK >](#)

Stay informed. Find resources across the country.

Access NACK RESOURCES [Attend WORKSHOPS](#) [Access TOOLS](#) [Recruit STUDENTS](#) [Attend WEBINARS](#)

The NACK commitment

The NACK Center is committed to supporting development of two-year degree programs in micro- and nanotechnology across the country by offering academic and educational resources.

Available Resources

Post-Secondary Resources

Introductory Level Modules: A series of thought-provoking nanotechnology PowerPoint presentations filled with in-depth material surveying where nanotechnology came from, why it is so unique, how it is practiced, and what it can do.

Undergraduate Level Course Notes: Packaged as six courses, each containing multiple modules. Each module can be rearranged to create new courses. Suitable for two-year degree programs, for certificate programs, and for freshman-sophomore use in four-year degree programs.

Undergraduate Level Laboratories: These are a set of six lab packages corresponding to the set of six course notes. Labs can be rearranged to accommodate new course arrangements. Suitable for two-year degree programs, for certificate programs, and for freshman-sophomore use in four-year degree programs.

K-12 Resources

Introductory Level Activities: Interactive nano-enabled products used to expand the imaginations of K-12 students with current applications benefiting from nanotechnology.

[CLICK HERE TO ACCESS RESOURCES](#)

[View/Download](#)

Done

Start MATEC - Microsoft Word Microsoft PowerPoint - [...] Mozilla Firefox Start Pag...

8:09 AM

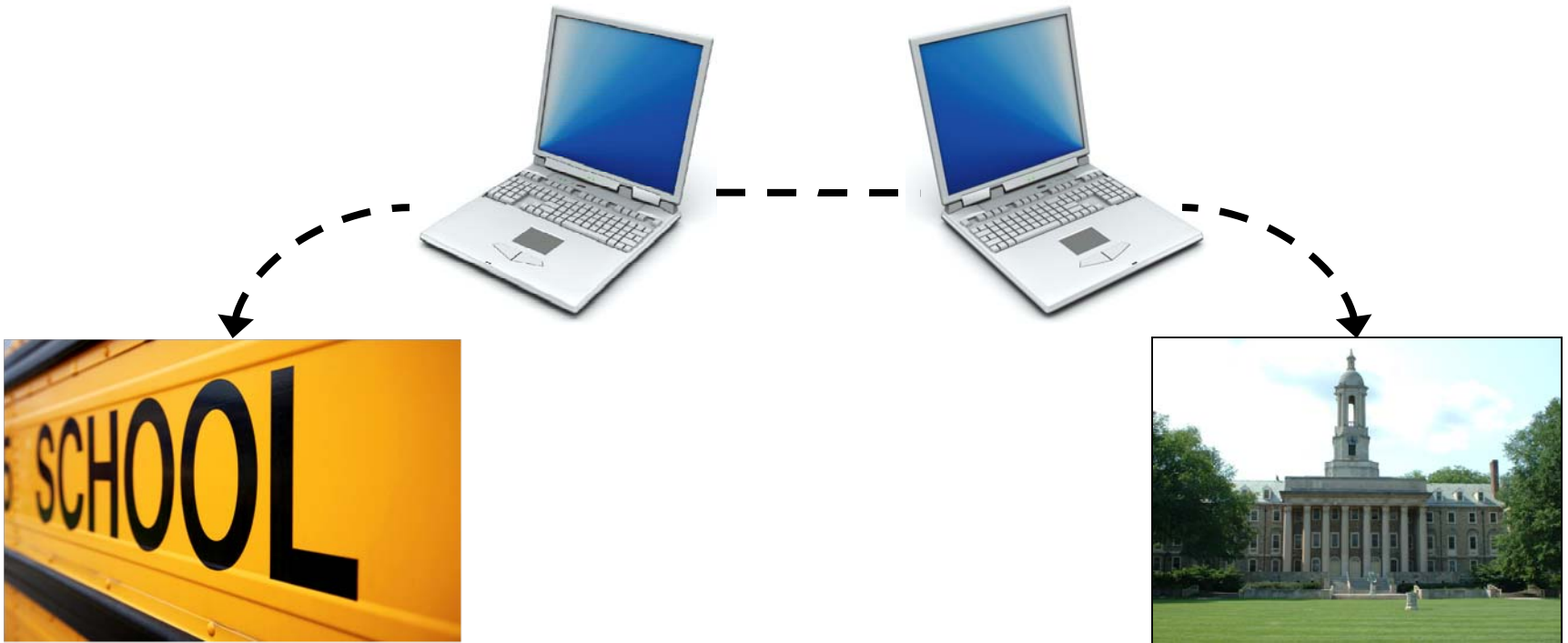


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Remote Access

- Remote Access is a way to utilize high-tech equipment at a research institution through an internet connection at your home school



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Remote Access Requirements

1. Computer with administrator access to install plug-ins and software
2. An internet connection
3. Speakers
4. Microphone
5. Projector connected to the same computer
6. Web browser (Firefox preferred)
7. Internet telephony (Skype preferred)



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Poll Question

Have you ever participated in a remote session before?

A. Yes

B. No



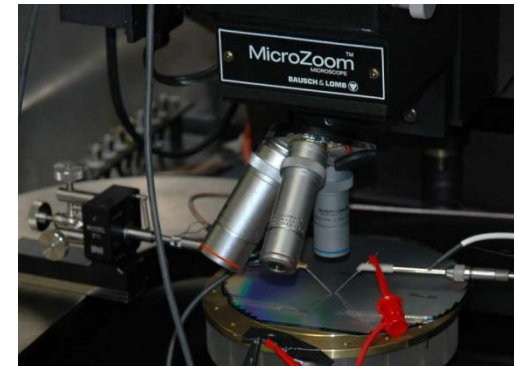
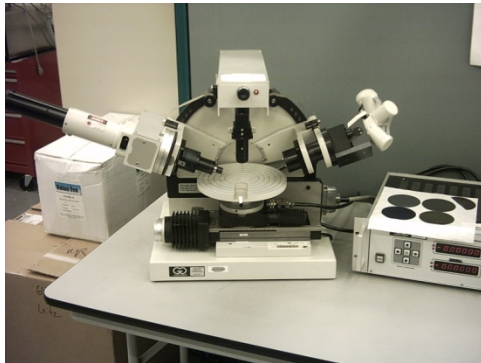
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Available Tools



- AFM (2)
- SEM w/ EDS
- FESEM w/ EDS
- IV & CV
- Optical Microscopes
- Spectrophotometer
- Profilometer
- Ellipsometer



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Questions?



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Nanotechnology in the Classroom

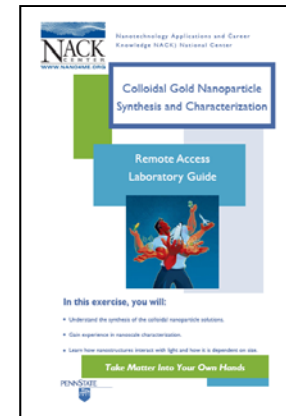
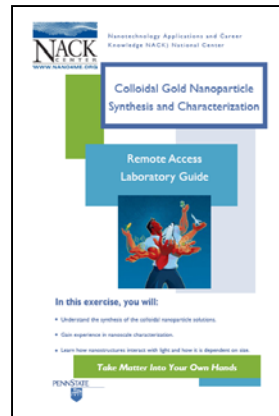
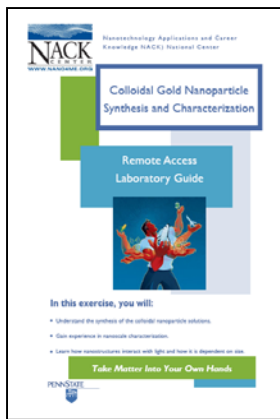


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Remote Access


- The NACK Center has integrated remote components into a number of classroom nanotechnology experiments.
- This access will allow students to visualize what they create first hand.



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Your Window into the Nanoworld



Nanotechnology Applications and Career
Knowledge NACK) National Center
WWW.NANO4ME.ORG

Colloidal Gold Nanoparticle
Synthesis and Characterization


Remote Access
Laboratory Guide



In this exercise, you will:

- Understand the synthesis of the colloidal nanoparticle solutions.
- Gain experience in nanoscale characterization.
- Learn how nanostructures interact with light and how it is dependent on size.

Take Matter Into Your Own Hands





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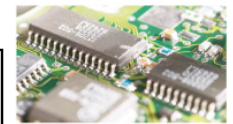


Materials

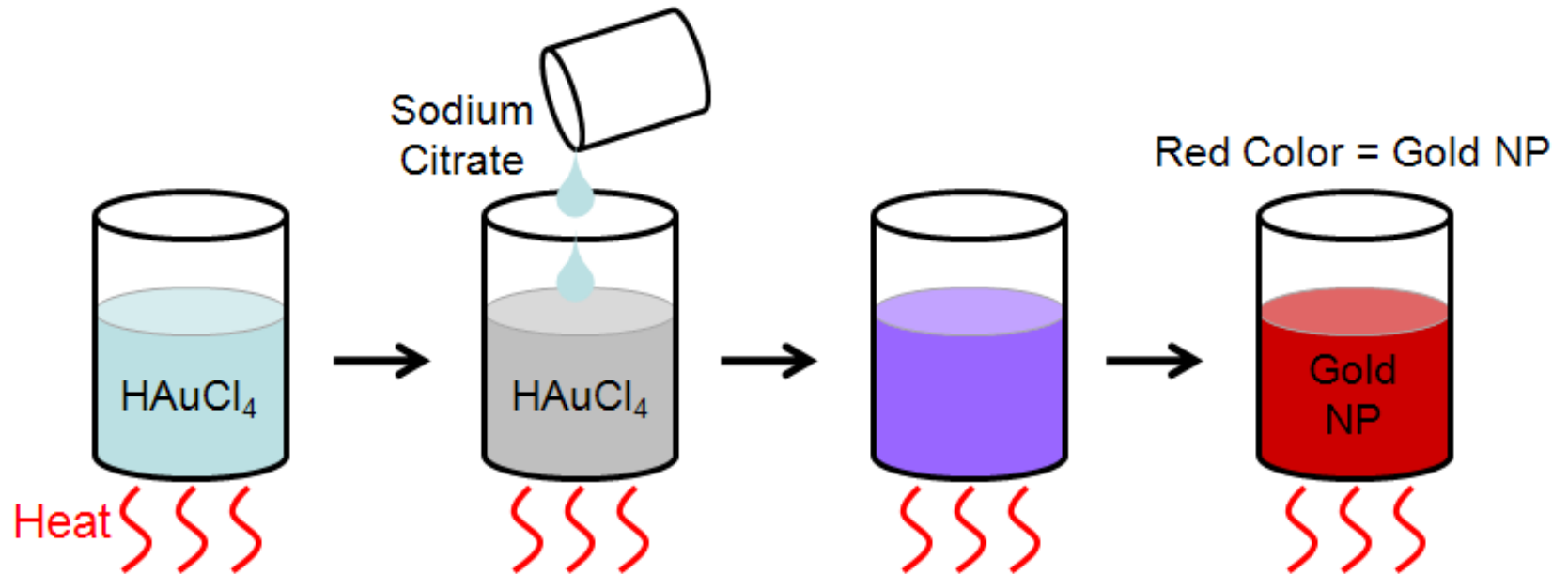
- Flinn Scientific Ruby-Red Colloidal Gold Nanotechnology Demonstration Kit (Cat #AP7117)
- 100mL Beaker
- Hotplate
- Heat Protection Gloves
- Safety Glasses
- Tweezers
- Silicon Wafer or Glass Microscope Slides
- 100mL (or larger) Storage/Waste Bottle
- AFM sample mounting supplies(optional)
- FESEM sample mounting supplies(optional)
- Shipping Supplies



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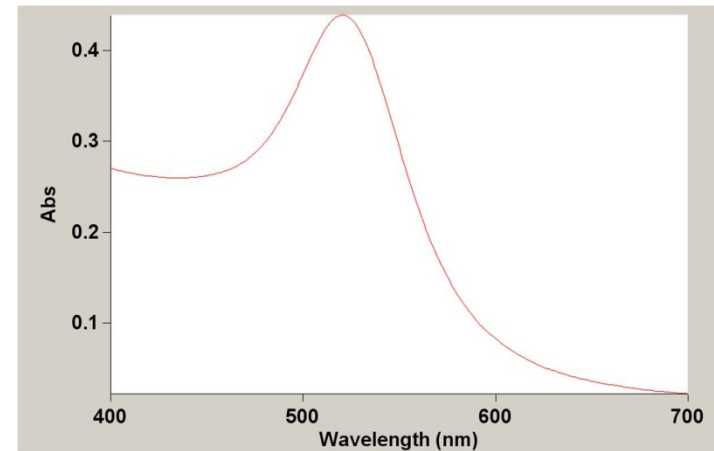
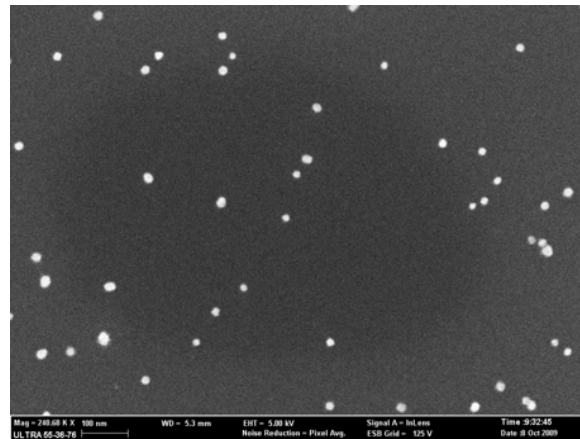
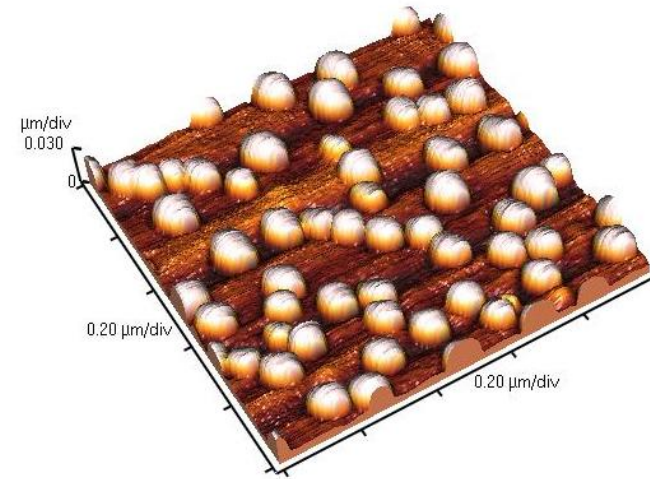
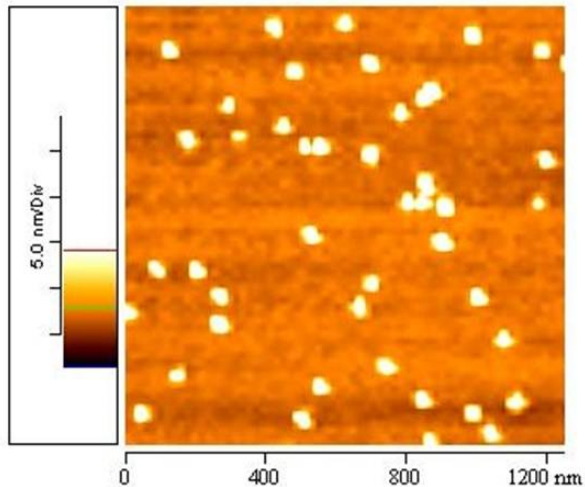
Synthesis



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Characterization

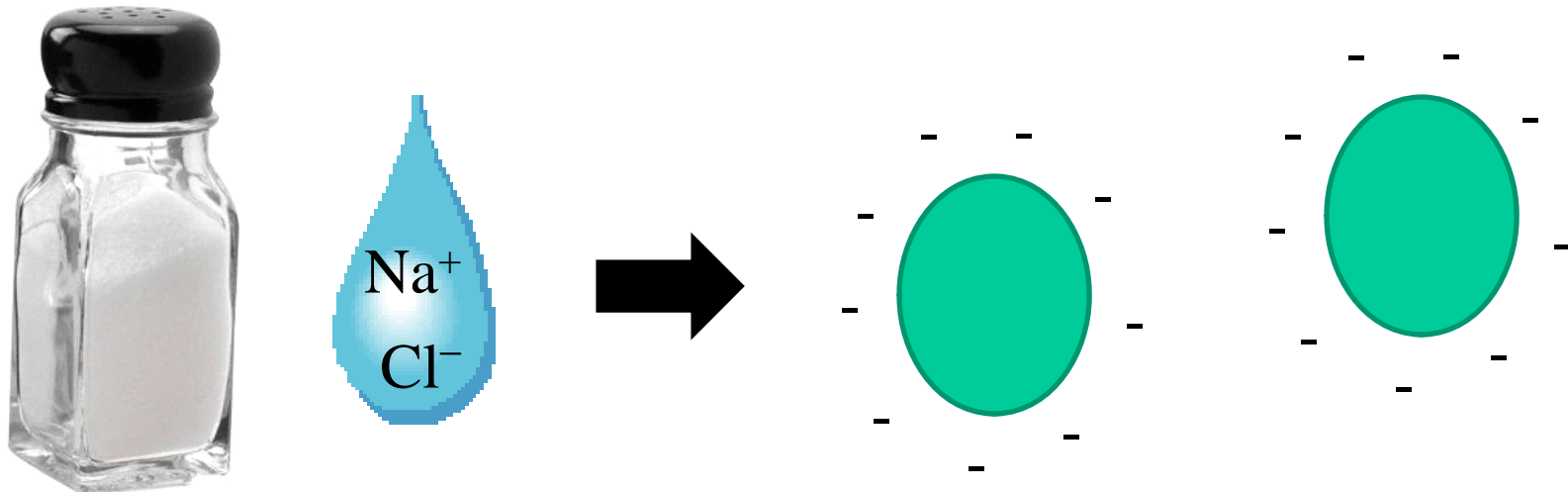


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Extension Activity

- The particles are repelled by one another due to surface charges on the citrate layer.
- What do you think would happen if we add an electrolyte to the solution?




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Remote Access

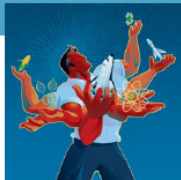
- We have a few other activities that integrate remote access that we can share with you as well.
 - Nickel Nanowires
 - Silver Nanoparticles
 - Nanoscale TiO₂ solar cells
 - Nanofiltration



Nanotechnology Applications and Career Knowledge (NACK) National Center
WWW.NANO4ME.ORG

Electrodeposition of Nickel Nanowires


Remote Access Laboratory Guide



In this exercise, you will:

- Understand the process of electroplating and its use at the nanoscale.
- Describe the function of a template as it applies to electrodeposition.
- Construct an apparatus for electrodepositing metal into a nanoscale template.

Take Matter Into Your Own Hands



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Remote Access

- If you have an idea for subject matter you currently teach in the classroom that you would like to add a characterization component to we can help develop this with you.



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Remote Access

- Perform lab experiments from a distance using equipment at Penn State CNEU Lab



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Remote Access

- Perform lab experiments from a distance using equipment at Penn State CNEU Lab
- There is no maintenance or initial investment in equipment



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Remote Access

- Perform lab experiments from a distance using equipment at Penn State CNEU Lab
- There is no maintenance or initial investment in equipment
- Use web video, audio, and chat to interact with a PSU lab technician who will be assisting with the experiment



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Remote Access

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- Send samples or use ours



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Remote Access

- Perform lab experiments from a distance using equipment at Penn State CNEU Lab
- There is no maintenance or initial investment in equipment
- Use web video, audio, and chat to interact with a PSU lab technician who will be assisting with the experiment
- Send samples or use ours.
- It's easy to sign up for remote time online at www.nano4me.org



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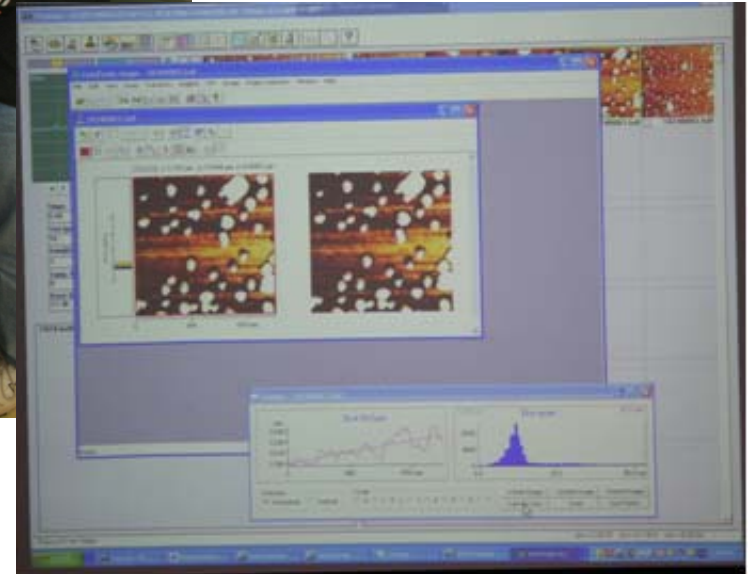
Questions?



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Remote Demonstration



www.logmein.com



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Questions?



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Thank you for attending

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TechSpectives Blog

Webinars

All this and more at [**www.matecnetworks.org**](http://www.matecnetworks.org)



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Webinar Recordings

To access this recording, visit www.matecnetworks.org,
Keyword Search: “**Nanotechnology in the Classroom
Laboratory**”



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NetWorks Upcoming Webinars

December 11: Reaching and Teaching Across Generations

February 12: Evaluating Student Impact

Visit www.matecnetworks.org for more details about these and other upcoming webinars.



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NACK Upcoming Webinars

January 22: **Intro to Nano-Characterization**

February 26: **Remote Access to
Nano-Characterization Tools**

Visit www.nano4me.org for more details about these
and other upcoming webinars.



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Join Us in Orlando, FL
July 26-29, 2010

Visit www.highimpact-tec.org as more details develop



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Certificate of Participation

If you attended the live version of this
1.5 hour webinar and would like a
certificate of participation, please email
darlene.cieplinski@domail.maricopa.edu



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How Can We Better Serve You?

Please take 1 minute to provide your
feedback and suggestions when we
email you a survey.
Thank you.



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