

NANOWIRE

RAIN's Quarterly Newsletter



January 2018

RAINDROPS



We are pleased to welcome three new members to our RAIN team: Coppin State University, The University of Iowa, and the University of Nebraska-Lincoln. This brings our total to 18 nodes. Look for introduction articles about these nodes in upcoming issues.



Five RAIN nodes (Erie Community College, North Seattle College, Salt Lake Community College, Cattaraugus-Allegany-Erie-Wyoming Board of Cooperative Educational Services (CABOCES), and Penn State University) are involved with a new NSF ATE project entitled "Nanotechnology Professional Development Partnership." These nodes are bringing remote experiences to the Introduction to Nanotechnology for Educators Workshop, a free live web-streaming workshop hosted by Penn State's Center for Nanotechnology Education and Utilization (CNEU). More information is presented later in this newsletter.



A recent survey of RAIN providers revealed they are involved with the initiative to be a part of a broader community of nano educators, help students achieve greater scientific and technology literacy, motivate and attract more students to STEM-related careers and programs, learn about available resources, and help K-12 educators attain their instructional objectives.



If you would like to learn more about bringing RAIN into your classrooms, please visit our [website](#). We are continuously looking for ways to improve and expand the RAIN network, so please [contact us](#). Be sure to check us out and like us on [Facebook](#), where you can find more exciting news about the nano-world.

RAIN IN THE CLASSROOM

E-Nanotechnology

Course with Real-Time Remote Labs

UI MICROFAB

University of Iowa Microfabrication Facility

OSTC

The University of Iowa Microfabrication Facility (UIMF) launched an online course in Micro and Nanofabrication in the fall of 2017, enabled by an Innovation in Teaching Technology Award. The topics of this multi-disciplinary course deal with the fundamentals of micro- and nano-fabrication techniques involved in the manufacture of a wide range of miniature devices with applications in areas as diverse as computing, communications, energy, medicine, genomics and bio-medical. This endeavor will enable students from various colleges and universities and working

professionals to remotely access and receive training on several state-of-the-art nanotechnology instruments. The key component in this course is the real-time and remote lab sessions in cleanroom environments designed to provide a more interactive and immersive experience for students.

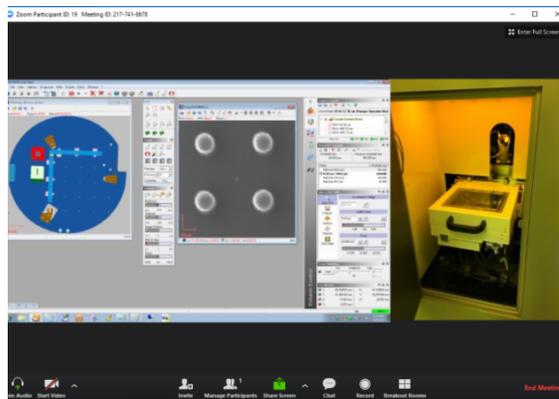


Fig. 1: The remote PC interface during a zoom video conference for a real-time remote lab session. Students can control the tools and processes, while viewing a live feed of the tool in action.

Students in this course are able to see the tools in action after remotely activating various steps and processes using the tool user interface via a Zoom video conferencing session (e. Fig. 1), assisted by a lab instructor, including the remote operation of a separate high-definition camera (Fig. 2). This experience fully engages the students and deliver an excellent learning and participatory experience. Some quotes from current students in the online nanotechnology course:

"This online course is a great introduction to the theory and practical applications of nanofabrication. Innovation at its finest where you can do a portion of the lab remotely."
Krissy Do, Development Engineer, California Nano Systems Institute, UCLA

"The interactive remote labs are an excellent method to reinforce the lectures and textbook."
Bill Tollefson, Principal System Engineer, Rockwell Collins, Cedar Rapids

The exposure of students at every educational level from schools, colleges to universities and working professionals to various stat-of-the-art nanotechnology equipment will inspire and spark their interest to initiate or continue their education in this multidisciplinary field. The new UI online course in nanotechnology with real-time and remote labs aims at contributing towards a strong nanotechnology workforce that will lead to transformational knowledge and technologies of the future.

Fig. 2: A snapshot of a live real-time, remote lab session showing the lab instructor in the cleanroom, including the high definition camera, tool and tool PC interface that are remotely controlled by students.



A full version of this article can be found [here](#).

PROFESSIONAL DEVELOPMENT

2018 Webinar Series

The NACK Support Center, in collaboration with the Nanotechnology Collaborative

Infrastructure Southwest at Arizona State University is offering four unique webinars this semester. The focus of these webinars is innovations in nanotechnology science, materials, technology, and new approaches to measurement at the nanoscale. These webinars are a great resource for professional development, and are designed as a resource to help teachers keep up-to-date with current technologies and provide useful student activities.

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Southwest

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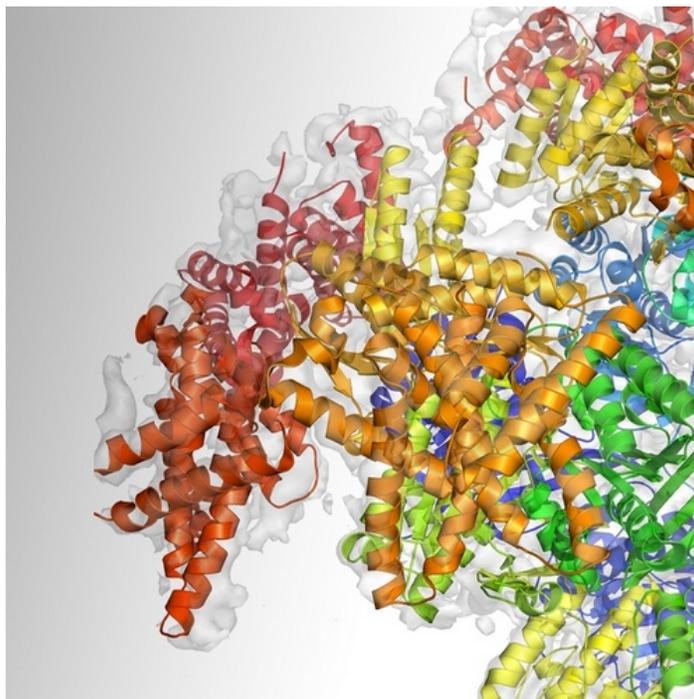


On **January 26 at 1 PM Eastern time**, join us for *Understanding the Biological Machinery by Cryogenic TEM Imaging and Structure Determination*. This webinar will discuss the current advances in cryogenically preserving biological assemblies and why the researchers behind them were recently awarded the Nobel Prize in Chemistry. Here is what the 2017 Nobel Prize Committee said about this topic:

Cool microscope technology revolutionizes biochemistry

We may soon have detailed images of life's complex machineries in atomic resolution. The Nobel Prize in Chemistry 2017 is awarded to **Jacques Dubochet, Joachim Frank and Richard Henderson** for the development of cryo-electron microscopy, which both simplifies and improves the imaging of biomolecules. This method has moved biochemistry into a new era.

https://www.nobelprize.org/nobel_prizes/chemistry/laureates/2017/press.html



Detailed reconstructions are now available with modern cryo-EM. 5N8Y. KaiCBA circadian clock backbone model based on a Cryo-EM density. DOI: [10.1126/science.aag3218](https://doi.org/10.1126/science.aag3218) image courtesy of FEI

[Registration](#) is free thanks to the support of the National Science Foundation. Look for more webinars in our series in February, March and April.

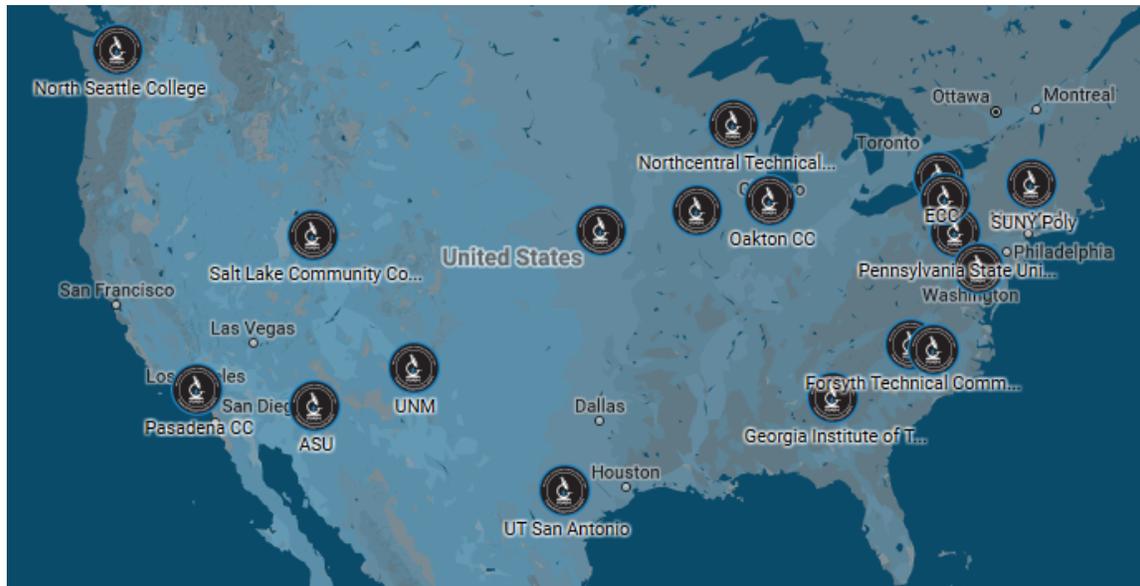
Nanotechnology Professional Development Partnership (NPDP) Workshop Series

The Nanotechnology Professional Development Partnership (NPDP), hosted by the Center for Nanotechnology Education and Utilization (CNEU) at Penn State, is proud to present an all new series of workshops for nanotechnology educators. These two types of free live web-streaming workshops provide great cutting-edge knowledge, professional development opportunities at no cost to you whether you need introductory information to the world of nano, are ready to implement nano-concepts into your classroom, or are interested in implementing a full nanotechnology program at your institution. These interactive workshops will use the video conference calling program, Zoom, to:

- Provide you with an introductory understanding of nanotechnology, as well as the current and future impacts of nanotechnology;
- Teach you the basics of nanofabrication processes and tools;
- Provide resources, such as labs, presentations, and more;
- Guide you to effectively teach undergraduate nanotechnology courses;
- Show you how cleanrooms are used both in institutions and for outreach by virtually visiting different cleanrooms around the country; and
- Offer you opportunities to network with the growing number of nanotechnology educators and program administrators across the U.S.

The first workshop, *Introduction to Nanotechnology for Educators*, begins on February 9, 2018. This workshop will be held in four consecutive Friday sessions (Feb. 9, 16, 23, and March 2) from 11:00 a.m. - 3:00 p.m. EST. [Applications](#) are due by January 26, 2018. For more information on this and the other workshops being offered, please visit www.nano4me.org/workshops.

RAIN PARTNERS AROUND THE U.S.



[Contact](#) any member of the RAIN leadership team if you would like to become a RAIN partner. Click on the map to see a more detailed listing of the RAIN partners.

LET US KNOW

We hope you enjoyed this edition of the RAIN newsletter. We look forward to sharing our news and updates this year. We would really like to hear from you; if there is some subject or topic that you would like us to discuss or look into, please let us know. Please visit and like us on our [Facebook page](#).

Regards,
The RAIN Leadership Team



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The NACK Network, in the Penn State College of Engineering, is committed to supporting the development of two-year degree programs in micro and nanotechnology across the country by offering academic and educational resources.

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