



NANOWIRE

RAIN's Quarterly Newsletter



RAIN-drops



The past few months have been a very busy time for the RAIN Network with lots of exciting new developments that we can't wait to share with you. We are delighted to welcome three new partners: The University of Texas in San Antonio, TX (UTSA); Forsyth Tech Community College in Winston-Salem, NC; and Oakton Community College (NSF ATE Project O.R.A.N.G.E) in Skokie, IL. To learn more about the UTSA site, please check out the article below. Profiles on the Oakton Community College and Forsyth Tech locations will be highlighted in our New Year edition.



RAIN participated in the National Nanotechnology Initiative's (NNI's) inaugural "National Nanotechnology Day" on October 12th. Eight RAIN network partners hosted "It's RAINing Across America," where concurrent classroom remote access experiences were shared. Teachers from across the nation were invited to either preschedule or "call in" to these national RAIN sites and experience hands-on demonstrations. It was truly a rewarding experience to be able to provide these teachers and students the opportunity to bring nanotechnology from our labs into their classrooms. We can't wait for next year!



What a way to wrap up 2016; we are so excited about the prospects for 2017. Our goal is to develop the RAIN Network by enabling more access sites across the nation. We hope you will join with us in our quest to engage students in classrooms across the U.S. We strive to introduce more people to the wonders of the nano-world through hands-on remote access to high-tech instrumentation and motivate them to consider pursuing future careers in this and other exciting emerging technologies.



If you want to learn more about using RAIN in your classrooms visit nano4me.org/remotearchive. Please be sure to visit and like us on Facebook at facebook.com/nanotechnology.rain. We love to hear and post about the most up-to-date and exciting news in the world of nano-characterization.

New RAIN Partner: University of Texas at San Antonio

RAIN is pleased to welcome the University of Texas at San Antonio (UTSA). The Kleberg Advanced Microscopy Center (KAMC) is located on the University of Texas at San Antonio. The KAMC was created with state-of-the-art instrumentation and expertise to develop a core facility; among other activities KAMC is focused on promoting collaboration, knowledge, training, and service.

The core instrumentation and techniques allow for cutting-edge high-resolution imaging and analytical characterization of an extensive number of materials. KAMC facilitates the use of resources to researchers from diverse background that conduct research in nanotechnology, biology, chemistry and condensed matter.

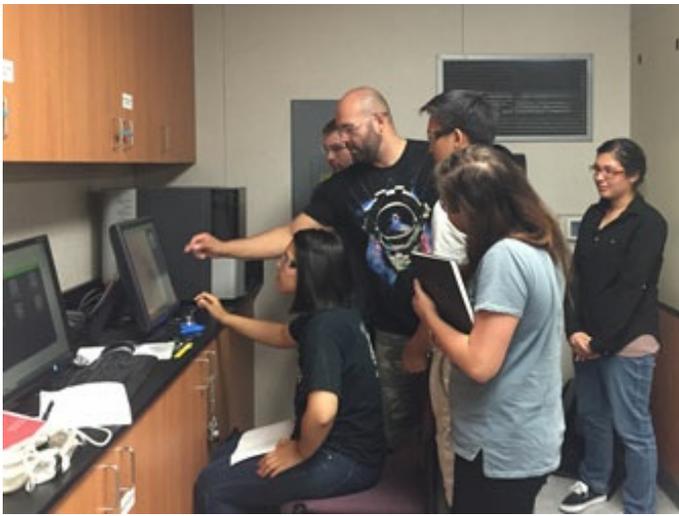


It DOES RAIN in Southern California

Jared Ashcroft, Jillian Blatti, Veronica Jaramillo, and Dave Douglass

Illustrations by Felix Monge

While it has become exceedingly difficult to find water in Southern California due to extreme drought conditions, there has been an excess of RAIN at Pasadena City College (PCC). Using our Phenom ProX Scanning Electron Microscope (SEM) with Energy-Dispersive X-ray Spectroscopy (EDS) from Nanoscience Instruments, we have quenched Pasadena's thirst for advanced technological education. Being part of the Remotely Accessible



Instruments in Nanotechnology (RAIN) community has been a tremendous asset for our students' success.

The Natural Sciences Division at PCC strives to provide research experiences for students that utilize advanced technological equipment. One of our major goals with broader impact is to increase success among our underrepresented minority student population. Through RAIN, students engaged in research and our science courses at PCC have accessed our SEM, AFM, and qNANO for remote experiments. Shown in the image above, Vince Aguierre is teaching PCC students how to operate the SEM as they analyze a paint sample.

It RAINs daily in our Early Career Undergraduate

Research Program (eCURE) at PCC. Examples of how we use RAIN in our research includes characterization of synthesized nanoparticles, analysis of materials such as paints, and nanoart. In the image shown to the right, eCURE student Felix Monge used his graphic design background to color an SEM image of fern sporangia to create nanoart. Eventually, we plan to hold a competition in which students can color SEM images and submit works of nanoart to be displayed in the Science Village at PCC.



RAIN has also allowed us to expand beyond the community college, as we are able to go out into the community and engage middle school and high school students with advanced nanotechnology. Shown below is an example of an outreach activity implemented by PCC eCURE students at APEX Academy in Hollywood, CA, in which they taught students how to make paints and then remotely analyzed the paint properties via SEM.



To make nanotechnology education even more widespread, PCC held a workshop for middle school and high school teachers in the Pasadena Unified School District (PUSD) focused on problem-based learning methodologies that utilize our SEM in several lab experiments. After learning how to access and use the nanotechnology equipment in these labs, PUSD teachers brought the labs back to their classrooms and used the RAIN network throughout the year to familiarize K-12 with current technological capabilities. The RAIN network is a powerful tool that teachers can use in their classrooms, and we encourage educators at all levels to integrate these resources into their course curriculum.

RAIN Goes International with Demo in Turkey

Our colleague, Ozgur Cakmak, recently made a special virtual visit to his alma mater in Turkey. Ozgur has been continuing his post-doctoral studies at Penn State and recently introduced the Electron Microscope to high school students (grades 9-11) from his home town. Students convened in their school seminar hall, where Ozgur began with a brief introduction to nanotechnology and the working mechanisms of the Electron Microscope, while connecting using a remote access software. Using this specialized equipment, students were able to examine gold nanoparticles, butterfly wings, ants, cicada wings, and the lotus leaf.

Post-viewing, students had the opportunity to pose questions and hear first-hand responses from Ozgur. In all, the response to this internet-based class, was very positive with students sharing how excited they were to participate in the interactive activity.

We



A student remotely investigating a field emission scanning electron microscope's electron beam gun tip.



Students and their instructors are taking a picture with Ozgur at the end of the session.

couldn't help but wonder how Ozgur was able to arrange this session with the 7 hour time difference between Turkey and PA, USA. He said that "the time difference does become a key factor and that he began the session around 7 am, 2 pm in Turkey." All in a day's work, as our RAIN tech-force make special efforts to bring the excitement and visual impact to students, in their classrooms.

How to Use Zoom for Remote Access



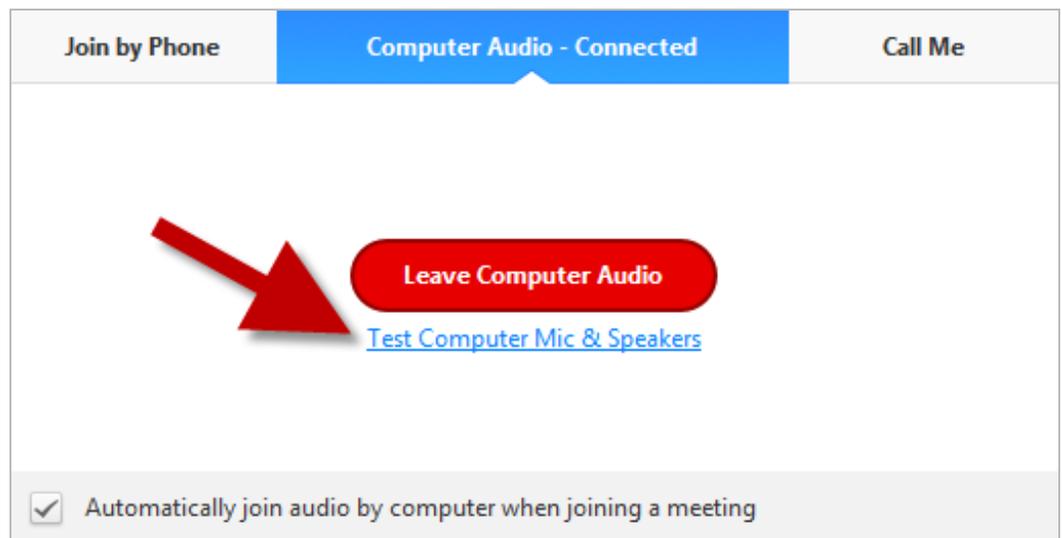
Zoom is web conferencing software that allows users to remotely control the advanced microscopy instruments available from RAIN.

The technical steps for connecting to the microscope are critical for ensuring a successful remote session.

At our RAIN labs, the microscopy equipment is connected to a computer, which allows for live imaging and full control of the lens' focus, zoom, and other functions. In order for you to participate remotely, we provide you with a method of viewing and controlling this lab computer. The software we use to facilitate this is called Zoom. (Some people say we were sold by the name, but we maintain it was the merits of the software.)

The most effective way to ensure your system is ready is to join a test meeting at <https://zoom.us/test>. This website provides clear instructions that are necessary to perform a test. The most common issue when installing Zoom is insufficient computer privileges, in which case you will need to contact your IT administrator for help.

Once connected to the test meeting, please also run the audio test. You are now ready for your live remote access session!

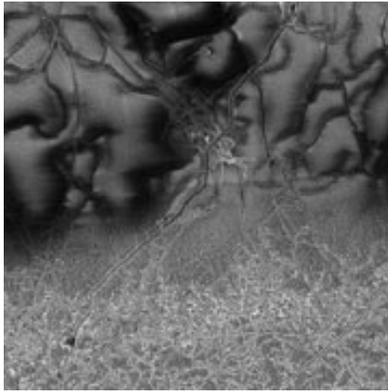


RAIN Partners Around the United States



[Contact](#) any member of the RAIN leadership team if you too would like to become a RAIN partner.

Featured Resource



Lab Guide: Silver Nanowire Synthesis and Characterization

Can you produce glass that conducts electricity? What about plastic? Surprisingly the answer to both questions is yes! Small silver wires billionths of a meter in size have made it possible to create glass and plastic substrates that are as conductive as copper wire.

The particular focus is the application of SEM to semiconductor device failure analysis.

Resource Link:

http://nano4me.org/remotearchives/resources/labs/Ag_nanowire_2016.pdf

Let Us Know

We hope you enjoyed this edition of the RAIN newsletter. We look forward to sharing our news and updates in the New 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. Visit us on Facebook, <https://www.facebook.com/nanotechnology.rain>.

Regards,

The RAIN Leadership Team



Bob Ehrmann
Pennsylvania State
University

Jared Ashcroft
Pasadena City
College

Frank Fernandes
Northcentral Technical
College

Jim Smith
Salt Lake
Community College

Kristine Schroeder
North Seattle College

Rich Hill
Erie Community
College

Ozgur Cakmak
Pennsylvania State
University



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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