



NANOWIRE

RAIN'S Quarterly Newsletter—Summer 2017



Building College-University
Partnerships for Nanotechnology
Workforce Development

RAIN-drops



RAIN is now officially taking the nation by storm! The RAIN partner list doubled in size from its original six sites to a present total of twelve up and running RAIN providers. Two recent RAIN additions are the University of New Mexico and Cattaraugus-Allegany-Erie-Wyoming Board of Cooperative Educational Services. CABOCES is a NY state high school collaborative and is RAIN's first foray into providers at the K-12 level. CABOCES is the featured "New RAIN Partner" later in this newsletter. The forecast is for continuing significant RAIN growth this summer. Stay tuned for further alerts...



There is nothing like a spring RAIN to liven up your classroom. A RAIN Impact study into K-12 classrooms in southern California was performed this spring - led by Dr. Jared Ashcroft (our Pasadena City College RAIN charter member). Six RAIN provider sites, across the nation, provided remote access experiences to ~850 students in 25 classrooms. Feedback data is presently being compiled and analyzed. Tune in for more detailed information in the next NANOWIRE edition.



RAIN providers will be busy this summer in Jim Smith's fair city on the Great Salt Lake (Salt Lake Community College). We hope to host a RAIN session at the [MNT Special Interest Group \(SIG\)](#) workshop on Tuesday July 18th. RAIN providers, from all across the U.S., will be providing continuous remote access demonstration sessions to [High Impact Technology Exchange Conference \(HI TEC\)](#) Technology Showcase attendees. If you'd like to get your feet wet with RAIN, look for us adjacent to the SHINE and NACK showcase booths (July 19-20). Want to learn more about RAIN, plan to attend our session at the HI TEC Conference session at 11:15 AM on July 19th. Hope to see you in Salt Lake City.



As a reminder, if you would like to learn more about using RAIN in your classrooms, visit nano4me.org/remotearchive. We are constantly looking for ways to improve and expand the RAIN Network, so please engage with us. Be sure to visit and like us on Facebook at facebook.com/nanotechnology.rain, where you can find exciting news in the world of nano-characterization, and perhaps what's new in your nano-world.



Science teacher Cathleen Woods from the Ellicottville's CTE center is shown with her students from the morning Medical Assisting class using the scanning electron microscope. They are examining a hair with "split ends" from the Cosmetology class.



New RAIN Partner: CABOCES

Cattaraugus-Allegany BOCES partners with 22 component K-12 school districts to meet the educational needs of all students in the area. Located in southwestern New York State, CABOCES encompasses 2,159 square miles in Cattaraugus, Allegany, Erie, and Wyoming counties. The combined public school enrollment is approximately 17,000 students. BOCES exists to provide cost effective sharing of educational services among local school districts. CABOCES operates 3 Career and Technical education centers in the two county area.

Being part of the RAIN network will allow us to share resources and educational opportunities in the field of nanotechnology for all of the students in our region. The regional economy is tremendously diversified. Although agriculture predominates, many small manufacturing firms are located in the area. The goals of the initiative is to provide students with a greater understanding of the importance of nanoscience and engineering in the development of new products and the college/career path to jobs in the nanotechnology field.

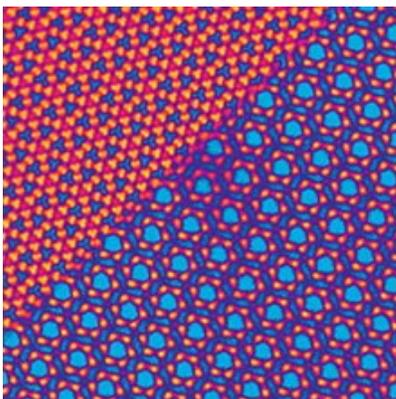


Image from 'Atom Art: Beauty at the Atomic Scale' exhibit

This image shows silicon nitride and highlights how differently atoms can organize in a material depending on how it was manufactured. All silicon nitride is composed of the same atoms, but those atoms can be arranged in very different ways. In this example, the silicon nitride, whose pattern is shown in the upper left, is much harder than the silicon nitride whose pattern is shown in the lower right.

The image was created by Jim LeBeau, an associate professor of materials science and engineering at North Carolina State University, and was part of an exhibit he helped curate (continued on the back)

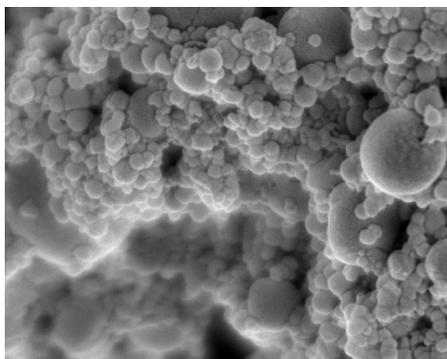
Engaging Your Students with Applications

Modifications of biomaterials is a current hot topic. The idea is to create nano-structures or nano-modified surfaces that can provide opportunities to enhance biocompatibility, minimize infections, and enhance materials properties over all.

According to [MIT News](#), every year more than a million Americans receive an artificial hip or knee prosthesis. Such implants are designed to last many years; however, in about 17 percent of patients, who receive a total joint replacement, the implant eventually loosens and has to be replaced early, which can cause dangerous complications for elderly patients.

To help minimize these burdensome operations, a team of MIT chemical engineers developed a new nanotechnology based coating for implants. The coating, which induces the body's own cells to produce bone that fixes the implant in place, could also be used to help heal fractures and to improve dental implants.

For those who are interested, you may be able to obtain nanocrystalline hydroxyapatite from <http://www.hydroxyapatite.com/>



Hydroxyapatite nanoparticles are incorporated into multilayer coatings for faster bone tissue growth. Image courtesy of the Hammond Lab

(continued from front) at the Museum of Life and Science titled "Atom Art: Beauty at the Atomic Scale."

The purpose of the exhibit was to show exactly what microscopy can do at the atomic-scale and explained how atoms are arranged, the patterns that they can make and how this is key to understanding a material's properties and how engineers can control those properties.

LeBeau wanted to show people that "we are now able to actually see atoms and the orderly way that atoms are arranged in a material. The beauty of these patterns highlights just how amazing nature is. Hopefully, we'll reach young people who may not have otherwise thought about pursuing science."

LeBeau added, "Some of my work is supported by the National Science Foundation and NSF thinks it is important to share our discoveries with the public. I agree. By partnering with the Museum of Life and Science, we are able to help people of all ages understand how we can glean insights into what materials look like at the most fundamental level."

The exhibit ran from Sept. 20 to Nov. 20, 2016.

The research was supported in part by an NSF Faculty Early Career Development (CAREER) award (DMR 13-50273). (Date image taken: 2013; date originally posted to NSF Multimedia Gallery: Jan. 25, 2017)

Credit: *James M. LeBeau, Materials Science & Engineering, North Carolina State University*

RAIN Partners Around the United States



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. Visit us on Facebook, <https://www.facebook.com/nanotechnology.rain>.

Regards,

The RAIN Leadership Team



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Contact any member of the RAIN leadership team if you too would like to become a RAIN partner.