

INL Intern Wins \$3,000 CAES Scholarship

By Brett Stone, INL Communications & Governmental Affairs intern



It may not be news for most people that advanced research goes on at Idaho National Laboratory. But many would probably be surprised to learn that one of the people conducting some of INL's cutting-edge research just finished her sophomore year of college.

Amanda Lang, a nuclear engineering student from University of Wisconsin-Madison, was recently awarded a \$3,000 scholarship by the Center for Advanced Energy Studies (CAES).

She was one of 10 students awarded a scholarship based on their INL summer internship work and their career plans for addressing the world's energy challenges. Nine other students received scholarships for \$1,000 each. Their summer projects varied widely, from technical writing to computer engineering and environmental science.

"The technical diversity of the outstanding set of winners highlights their broad set of talents," said Oren Hester, CAES Deputy Director. "Such a talent base will be needed to produce innovative solutions to the energy challenges of today and tomorrow."

This is the third year CAES has awarded scholarships to INL interns. It launched the program to help fulfill its mission of increasing the number of students entering the energy field. Since 2008, CAES has given out \$32,000 in scholarships.

Lang earned her scholarship for research and development performed while working as an intern at INL's Advanced Test Reactor National Scientific User Facility (ATR NSUF) this summer.

She was chosen from a highly competitive pool of roughly 260 interns working at the lab.

"I was very excited," said Lang shortly after hearing the announcement that she had won. "It's good to know that my project was valued and it was important to INL."

Lang spent her summer working on developing a special computer code that examines several factors to determine the radiation dose someone would receive if they handled specific materials that had been irradiated in the ATR.

"Amanda's program will be used by researchers to estimate the dose from material samples so they can determine if these materials can be handled outside of a hot cell or require handling in a shielded facility," explained Lang's mentor, Mitch Meyer.

Lang hasn't quite decided on a career path — she's debating between nuclear power plant engineering and researching nuclear applications in the medical field.

But she says the scholarship money will be useful in helping her along her way.

"I'll use it toward tuition and books, so it will help me focus more," Lang said. "I have a research job at the lab at UW Madison, so I can focus more on that instead of getting another part-time job or something, which will give me more experience in the nuclear field."



Five Recognized for Contributions to CAES

By Kortny Rolston, CAES Communications

The Center for Advanced Energy Studies recently honored five employees from its partner institutions for their contributions to CAES and its mission.

Jennifer Ambrose of Boise State University, Cheryl Hanson of Idaho State University, Joanna Taylor of University of Idaho and Mitch Meyer of Idaho National Laboratory were named CAES Outstanding Employees while Dr. Darryl Butt, a BSU professor and CAES associate director, received a special achievement award.

This is the first year CAES has given out the awards.

“All of our honorees have contributed significantly to the success of CAES in different ways and deserve to be recognized for their efforts,” Director Harold Blackman said. “We plan to continue to hand out these awards in the future. CAES is a success because of the commitment of the people from our partner institutions.”

Jennifer Ambrose is an office administrator for Boise State University's Materials Science and Engineering Department. She was nominated by Dr. Darryl Butt and Dr. David Solan, CAES associate directors from Boise State. Ambrose's office oversees the research expenditures and administrative processes for the department, which leads the CAES advanced materials initiative.

In their nomination letter, Butt and Solan, director of CAES' Energy Policy Institute, wrote: "Jennifer manages to keep things flowing incredibly smoothly with a very small staff. She is incredibly innovative and has automated many processes and simplified the bureaucracy for our faculty, staff and students."

Cheryl Hanson is the campus architect at Idaho State University. She was nominated by Blackman and all the CAES associate directors. Hanson helped oversee the construction of the CAES facility and continues to work on projects for the building. She recently helped reconfigure the CAES' Imaging Center to accommodate several new pieces of equipment.

"Cheryl is the one who really built CAES. She managed all the interfaces with the contractors as well as the state," Blackman said. "It was a very difficult job making sure all the needs and requirements were met, but throughout the process she was available and helpful and continues to be. She helped make CAES what it is today."

Joanna Taylor is a researcher from University of Idaho. She was nominated by the CAES management team as well as Dr. Bob Smith, a CAES associate director from University of Idaho. Taylor has been instrumental in helping establish safety and operating procedures, design layout and functional requirements, and define infrastructure needs for the laboratories at CAES.

In their nomination letter, the CAES team wrote: "On operational and safety fronts, Joanna has been a potent catalyst for CAES team building and trust. Joanna's ever-present positive attitude and smile are contagious. (She) has made enormous contributions that will enable CAES to achieve success."



Mitch Meyer is the scientific manager for the INL's Advanced Test Reactor National Scientific User Facility. He was nominated by the CAES management team for the award. Meyer helped convince INL to invest in new equipment for the CAES imaging center, which is home to a high-end atom probe, scanning electron microscope and other items.

"Mitch has been a key contributor to the development and establishment of the new imaging center at CAES, which will be accessible to both university and INL researchers," Blackman said. "From the start, Mitch has believed in the CAES mission and has been willing to invest financially and emotionally in the collaborations being built here."

Dr. Darryl Butt is the head of Boise State's Materials Science and Engineering Department and serves as a CAES associate director. Butt also leads CAES' advanced material initiative and oversees the facility's materials laboratory. He has hired two new BSU materials researchers who work at CAES in Idaho Falls full time.

"Darryl has been a steadfast contributor to CAES, first as a researcher who saw the vision of the partnership and now as an associate director," Blackman said. "He was very successful early on in bringing work to CAES. He continues to be responsive to all of our needs and is helping make CAES a lasting legacy for the Idaho universities and INL."



A Minute With Supathorn Phongikaroon

By Kortny Rolston, CAES Communications

Supathorn Phongikaroon is an assistant research professor at the University of Idaho in Idaho Falls. He received his Ph.D. in chemical engineering in 2001 and his B.S. in nuclear engineering in 1997 from the University of Maryland. Before joining UI, Phongikaroon worked at Idaho National Laboratory where he researched the development of advanced nuclear fuels and processes that result in more efficient use of nuclear energy reducing waste. His current interests focus on theoretical and experimental studies of pyroprocessing technology—electrorefinery, electrolytic oxide reduction and chemistry, and ion exchange—relating to interfacial phenomena and multi-phase flow systems.

How long have you worked at CAES?
Almost two years.

Which research projects are you involved with at CAES?
All projects are related to fundamental studies in reprocessing technology for spent nuclear fuel via ionic liquids.

What do you like best about working at/with CAES?
CAES has an awesome environment—a combination of academic universities,

national laboratories, and commercial industries—that focuses on advanced energy problems.

Has CAES led to any new research projects or collaborations for you?
Yes. Several research projects at CAES have led to collaborations with other institutions and laboratories such as North Carolina State University, Seoul National University, and Korea Atomic Energy Research Institute.

What do you do in your free time?
Rock climbing, backpacking, running and road and mountain biking.

What is your favorite movie?
Forrest Gump because of that one quote: “Life is like a box of chocolates. You never know what you’re gonna get.”

Favorite book?
Lord of the Rings because of the true power and belief in the fellowship.

If you were a superhero, what would your superpower be?
I would like to have Aquaman’s power—super speed and power in the water and the ability to breathe underwater and communicate with ocean animals.

Energy Secretary Visits Idaho



U.S. Secretary of Energy Steven Chu addressed employees from CAES, Idaho National Laboratory, the Naval Reactors Facility and cleanup contractors during a September 13th visit to Idaho. More than 200 people gathered at CAES to hear Chu speak.

CAES Research Updates

By Kortny Rolston, CAES Communications

CAES' research focuses nuclear science and engineering, advanced materials, carbon management, bioenergy and energy policy.

Here is the latest news from our research initiatives:

Nuclear Science and Engineering

- Idaho State University has hired Dr. Eric Burgett as a new assistant professor in nuclear engineering and CAES affiliate researcher. He is conducting cutting-edge research on nanotechnology (nanophotonic and photonic crystal) and ultrafast scintillator designs for novel radiation detectors. Burgett received his Ph.D. from the Georgia Institute of Technology in 2010 in Nuclear Engineering and his M.S. from Georgia Tech in 2008.

Advanced Materials

- Boise State University recently hired Jatu Burns, a research scientist, to work on several materials projects at CAES. She works under Dr. Darryl Butt, a CAES associate director from

Boise State University. Burns graduated with a master's degree in materials science and engineering from BSU where her research involved fatigue crack growth testing and microstructural characterization.

- Operational capabilities of the Advanced Materials Lab at CAES have been developed to include sample preparation, high-temperature experimentation, microhardness testing and imaging. These capabilities are available to users of the lab, CAES, partnering universities, and INL.

Carbon Management

- Thirty-two researchers from INL, BSU, ISU and UI recently attended a carbon management workshop at CAES. They learned about CAES' carbon management research and potential new research opportunities. The workshop is the first in a series that will be held around the state. The goal is to increase the number of researchers involved in the CAES carbon management initiative.

Bioenergy

- CAES is hosting a summit October 20-21 to showcase its bioenergy projects and research expertise in various feedstock areas. Industry representatives have been invited to participate and will discuss their needs and ideas during a panel discussion. The summit will be held at the CAES facility in Idaho Falls.

Energy Policy

- The Energy Policy Institute (EPI) hired Lisa Wennstrom as an event coordinator to plan the 2011 energy policy research conference, as well as policy roundtables. Karen Andreason is EPI's new administrative assistant.
- Dave Koehler has joined EPI as a temporary project coordinator coordinator, a position he will hold until June 30th. Dave will assist in proposal development and coordination of new projects as they come online. He has a master's in public administration from BSU and has done contracting with the high tech sector.

NEUP 2010 Awards Provide New Equipment to Three Idaho Universities

By Kortny Rolston, CAES Communications

Idaho's three public universities were recently awarded \$655,000 from the U.S. Department of Energy to purchase new laboratory equipment and upgrade a reactor.

Boise State University received \$260,000 for a scanning electron microscope, which will be housed at CAES, while Idaho State University was awarded \$145,000 to complete work on its research reactor. University of Idaho received \$250,000 for nuclear research equipment.

The money was awarded through DOE's Nuclear Energy University Programs (NEUP) initiative. This is the second consecutive year the Idaho universities have been awarded equipment and infrastructure grants by NEUP.

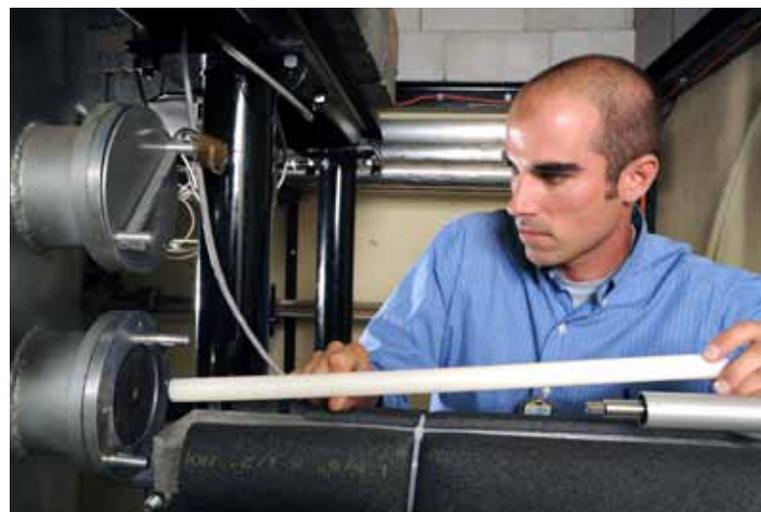
Dr. Rick Ubic, a materials researcher at BSU and CAES affiliate professor, said the scanning electron microscope (SEM) will be used to analyze the structures of nuclear

materials, including fuel surrogates, graphite, and structural alloys.

"A modern analytical SEM is an essential, fundamental tool for the structural study of nuclear materials and materials science in general," he said. "This instrument will be unique in the state and support a whole range of research activities at Boise State, CAES, and beyond."

Nine Idaho university students also won \$5,000 scholarships through NEUP.

The recipients are: Chloe' Lombard and John Winston of Boise State; Robert Carlsen, Nicholas Short, Tew Logan,



Clint Thomas and Kyle Woodhouse of Idaho State University; and Nicholas Eimers and Zachary Wuthrich of University of Idaho.

Researchers Gain New Perspective in the CAVE

By Brett Stone, INL Communications & Governmental Affairs intern

Hollywood movie studios aren't the only ones embracing 3-D technology.

Researchers at Idaho National Laboratory and the Center for Advanced Energy Studies are using a new 3-D computer assisted virtual environment – or CA-VETM - to literally walk into their data and examine it from various angles.

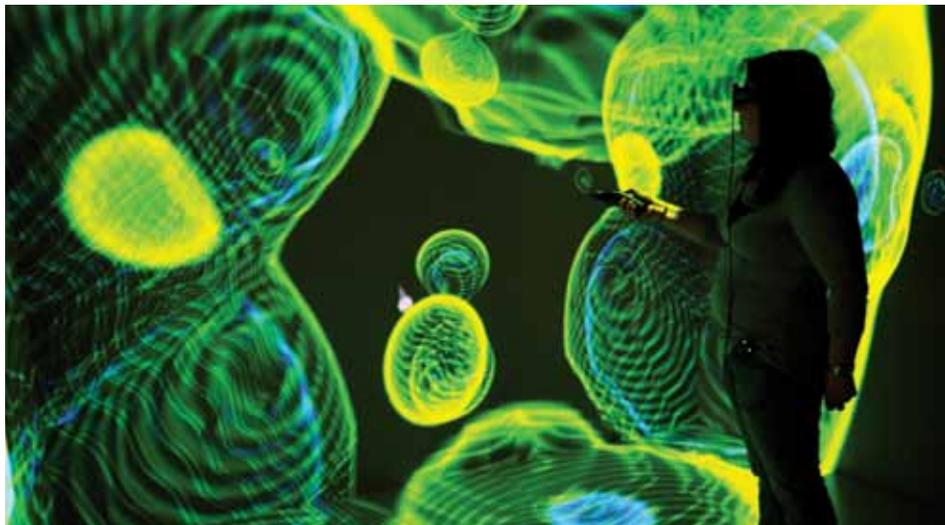
With the Mechdyne FlexTM, users can see how a protein in a catalyst is organized or look over the nuts and bolts inside INL's Advanced Test Reactor facility.

"This is an advanced tool for our scientists," said Patrick O'Leary, director of INL's Center for Advanced Modeling and Simulation. "This allows them to enter their data and look at it in ways they can't on traditional computers."

The Advanced Visualization Laboratory, located on the second floor of the CAES facility, resembles a cave – black walls, ceiling and carpet and dim lights reduce glare. In the middle of the room stand three white walls, each 10 feet wide, and a slightly raised white floor.

Projectors mounted behind the walls and on the ceiling create 3-D images. With the help of specialized 3-D goggles and handheld controller, a user is able to step into the CAVE and manipulate data. (The system is designed to track the movement of a user's head and controller so the images can react accordingly.)

Researchers can walk around corners, crouch on top of ATR's heat exchangers



or twist an enzyme to view its molecular structure from a different angle.

"These are very powerful tools," said Keith Wilson, who helps operate the Advanced Visualization Laboratory. "And they're pretty cool too."

Since coming on line in June, scientists and engineers have already used the CAVE for a variety of projects. It is even being used to help with maintenance of the ATR.

Engineering teams have toured a virtual model of the ATR in the CAVE to train staff, orient subcontractors, and consider new designs.

By using the CAVE, the ATR engineering teams can spend as much time as needed to plan, measure and try different options. The image is so detailed that they can tell whether a valve will scrape their knuckles or if pipes will have to be re-routed, saving costly time, materials and labor.

"The immersive environment operates under a paradigm that places the users' data at their fingertips," O'Leary said.

Travis McLing, the technical lead for the carbon sequestration project at INL and CAES, agrees.

He and others on his team have used the CAVE to determine whether a

location could be suitable for long-term storage of carbon dioxide.

McLing's team used LiDAR or "laser radar" to scan Malad Gorge and create a 3-D model. The gorge provides researchers with a meticulous cross-sectional view of what the earth looks like beneath the surface and whether that type of rock would be suitable for storing carbon dioxide.

The LiDAR is detailed enough that someone can virtually rappel down the cliffs and identify features as small as a human hand took one day. Creating similar details with other processes would likely take a full year.

"If we're going to do carbon storage, we've got to provide the public with accurate and up-to-date information," said McLing.

Projects like McLing's are examples of why INL invested in the CAVE system, O'Leary said.

"A lot of the research going on today involves modeling and simulation and the FlexTM is one of the best ways to view that data," he said.

Quick Facts

- The CAVE technology was developed in the 1990s by researchers at the Electronic Visualization Laboratory at the University of Illinois-Chicago researchers.
- CAES is the only facility in Montana, Idaho, and Wyoming with a CAVE.

To submit story ideas, calendar items or other information for upcoming CAES newsletters, please send an e-mail to Kortny.Rolston@inl.gov.