



INSIDER

Newsletter for the Employees of Ames Laboratory ■ Volume 16, Number 7 ■ July-August 2005

Gleeson and Sordelet Win R&D 100 Award

Innovative bond coats will improve gas turbine engine performance

Brian Gleeson and Dan Sordelet have won a 2005 R&D 100 Award for the development of novel platinum-modified nickel-aluminide coatings that deliver unprecedented oxidation resistance and phase stability as bond coat layers in thermal barrier coatings. The new bond coats promise to significantly improve the reliability and durability of gas turbine engines, allowing them to operate at higher temperatures and extending their lifetimes.

The *R&D Magazine* program, now in its 42nd year, honors the top 100 products of technological significance marketed or licensed during the previous calendar year. The winning of an R&D 100 Award provides a mark of excellence known to industry, government and academia as proof that the product is one of the most innovative ideas of the year. Since 1984, Ames Laboratory has earned 15 prestigious R&D 100 Awards.

"This is quite an honor to be selected for such a prestigious award," said Gleeson. I also think winning the award is a credit to ISU and the Ames Lab and the excellent support they provide. This is really a fantastic place to do research."

Commenting on the R&D 100 win, Secretary of Energy Samuel Bodman said, "This award demonstrates that DOE scientists and researchers are hard at work developing the technologies of the future. In the past, breakthroughs like this have played an important



Dan Sordelet (left) and Brian Gleeson have won a 2005 R&D 100 Award for their development of new bond coats for thermal barrier coating systems.

role in both our economic and national security."

Ames Lab Director Tom Barton had high praise for the new bond coat technology, saying, "It would be difficult to overestimate the importance of these novel coatings in enhancing the capabilities of the next generation of jet engines in commercial and military aviation."

Gleeson and Sordelet's award-winning technology will be featured in the September issue of *R&D Magazine*. The two researchers will be recognized at the R&D 100 Awards Banquet in Chicago in October. ■

~ Saren Johnston

Cooperation Key in MFRC's Success

Partners gather for sixth annual meeting

It was a little like a homecoming when Midwest Forensics Resource Center partners gathered for their sixth annual meeting, June 23. The forensic science community is a close-knit family, and any gathering is an excuse to exchange ideas and news. The chitchat quickly died down, however, when MFRC director David Baldwin brought the meeting to order by offering the following invitation, "This is an opportunity for you to have input into our program and tell us where you'd like us to head for the next year."

With that, the meeting kicked into high gear with presentations on research projects being funded by the MFRC. The first presentation was on the LIMS, or Laboratory Information Management Systems, project. LIMS research is being conducted by scientists in the Iowa State University College of Business logistics, operations and management information systems department.

According to researchers, LIMS is a direct response to the growing level of information coming into forensics laboratories and the need for crime labs to efficiently manage this information. Anthony Townsend, ISU associate professor, says the project will identify the requirements forensic labs have for LIMS systems and then use the method to assist those labs in selecting, buying and implementing lab information-management systems.

Part of Townsend's presentation was to outline some of the categories of things that labs might like to have in their LIMS system. Some examples included blood alcohol, DNA fingerprinting, firearms, toxicology, physical evidence, as well as customer service and billing information.

When he asked MFRC members for other ideas, their suggestions flowed back fast and furious. "Digital analysis, crime-scene evidence, toolmark and serial-



Program manager for the NIJ, John Paul Jones (center), talks with Larry Schultz (right) from the Indianapolis-Marion County Forensic Services Agency as MFRC technical commercialization specialist Todd Zdorkowski looks on.

number analysis," were some of the additional categories suggested. Townsend recorded the members' suggestions then told them the next phase of his project will be to visit individual partner forensic labs to further determine their needs. He will then use that information to finalize the LIMS evaluation tool.

In addition to LIMS, other MFRC-funded research projects highlighted included research to develop a method to recover ignitable liquid residues from arson debris. Another presentation was given on trace-metal analysis of the drug Ecstasy. In this research, trace elements in Ecstasy samples obtained from law-enforcement agencies will be determined by inductively coupled plasma-optical emission spectrometry using microwave-assisted digestion. The goal is to determine elemental patterns or signatures that will help experts identify common sources of Ecstasy tablets.

The final presentation was on steganography, which is simply the act of hiding messages in computer images. Steganography is used by criminals to send information over the Internet. Steganalysis is the detection

of these messages, which is of importance to cyber forensics. The goal of the research, which is being performed by professors in the ISU mathematics department, is to develop a prototype software system that will be able to tell experts if a computer file contains hidden messages.

One new member who listened to the presentations with particular interest was John Paul Jones. Jones is the program manager for the Office of Science and Technology, which is an office in the National Institute of Justice, or NIJ. The NIJ is the research, development and evaluation agency of the U.S. Department of Justice. The NIJ provides major funding for the MFRC.

According to Jones, the NIJ focuses on research and development for state and local law enforcement agencies. He said he came to the annual meeting to get a "firsthand look" at the type of research projects upon which the agency's money is being spent.

"I'm pleased with the way the MFRC is fulfilling its agreement with the NIJ," said Jones. "And I'm already thinking of ways they (MFRC partners) can cooperate with other agencies I oversee."

Cooperation is an element of the MFRC that is of great interest to Larry Schultz, who is the director of the Indianapolis-Marion County Forensic Services Agency. His agency is the newest member of the MFRC Midwest partnership. The addition of the state of Indiana brings the MFRC's membership of crime laboratories and universities to 11 Midwestern states, which is an obvious source of pride for director Baldwin. As for his interest in the MFRC, Schultz says he was drawn to the organization because of its strong connection to the university research community.

"To me this is the ideal situation – a consortium of academics and practitioners who share ideas," said Schultz, who added that there are only 300 accredited crime labs in the United States. "And they just don't have time to do the research that needs to be done, which is why the opportunity to converse and bring our problems to the MFRC is a great resource for us," he said. ■

~ Steve Karsjen



President Geoffroy Congratulates Lab

In the following June 30 interoffice communication to Director Tom Barton, Iowa State University President Gregory Geoffroy congratulated Ames Laboratory on the results of the Lab's 2004 performance appraisal.

"I want to congratulate you and all the members of the faculty and staff of the Ames Laboratory for receiving very high marks from the U.S. Department of Energy in the 2004 performance appraisal of the Lab.

The Lab's 'Outstanding' ratings in science and technology, and environmental health and safety, and 'Excellent' rating in strategic guidance, oversight and management are tremendous indicators of the very high standards to which the Ames Lab adheres, the excellence of its science and technology programs, and the very high quality of its administrators, faculty and staff. Indeed, the 'Outstanding' rating in science and technology, which is the most heavily weighted of the three criteria (70%), is most impressive and reflects very highly on the overall excellence of this critically important national research and development resource.

We are very proud of the Ames Laboratory as a central part of Iowa State University, and we commend you on this outstanding achievement." ■



Sen. Harkin Tours Lab

U.S. Sen. Tom Harkin (right) visits with Vitalij Pecharsky (left) about magnetic refrigeration during a tour of Ames Lab on August 3. Alan Goldman and Jon Murphy are to the left and right of Sen. Harkin, respectively. Harkin also heard a general presentation on Ames Lab research and a presentation by George Kraus on bio-related initiatives.



Central Academy Shines

The science bowl team from Central Academy in Des Moines showed their science "stuff" when they finished among the top eight teams at the National Middle School Science Bowl in Golden, Colo., June 23-26. The students earned the trip to the national event by making their way undefeated through the championship match in the Ames Laboratory/ISU Middle School Science Bowl in April. Their admirable

performance at the national event earned the Central Academy team \$500 for their school. ■

Note of Correction

In the "New Employees" section of the June 2005 issue of *Insider*, the job title for Michael McGuigan was incorrectly listed as health physics technician. McGuigan's title is Health Physicist IV. The *Insider* regrets the error.

Mallapragada on U.S. Security Group

Surya Mallapragada will join a study group that assists the United States with the science and technology of defense and national security.

Mallapragada, Ames Lab's Materials Chemistry and Biomolecular Materials program director and an Iowa State associate professor of chemical and biological engineering, will join the Defense Science Study Group in 2006. The study group is part of the Institute for Defense Analyses, a non-profit corporation funded by the federal government that administers three research and development centers.

Each year the study group invites 12 to 15 young scientists from the nation's universities and research centers to take part in its two-year program focused on defense policy, research and development. The study group also looks at the systems, missions and operations of the U.S. military. Researchers are nominated to the group by academic officers in their home institutions, study

group alumni or members of the U.S. defense establishment.

"The (study group) doesn't go strictly by people who are doing typical defense-type projects," says Mallapragada, whose research includes designing polymers for various bioengineering applications, including medical applications. "It's a chance to meet other researchers working in similar areas and, more importantly, to see what needs are out there and come up with some exciting new ideas."

Study group members annually participate in a series of four sessions at various defense installations and military contractors across the country. The program commits participants to about three weeks per year. Mallapragada's appointment will begin in 2006 and continue through 2007. ■



Surya Mallapragada

From Student to Scientist ...

Innaugural SULI program draws praise from students and mentors

In eight short weeks this summer, 10 undergraduate students from colleges and universities across the country experienced life in a real-world research setting in laboratories at the Ames Lab. The students were at the Lab as part of the Department of Energy's Science Undergraduate Laboratory Internship, or SULI, program.

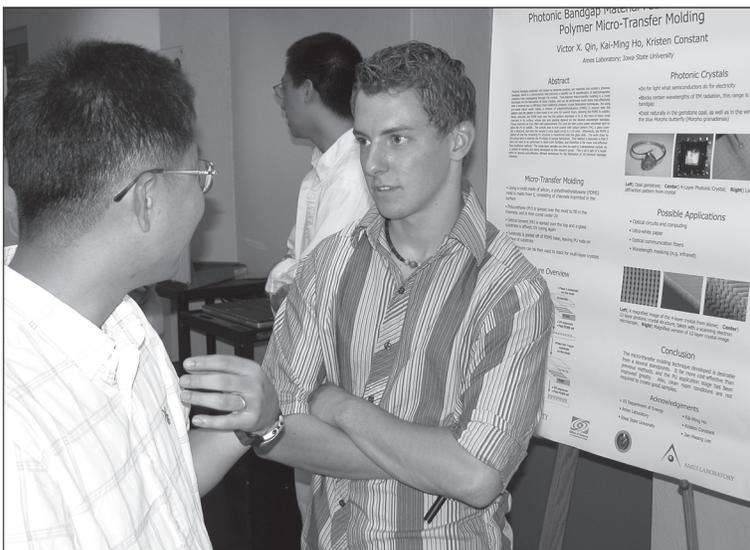
Although the internships focused on the research the students performed in laboratories under their mentors' guidance, along the way there was also time for other enrichment activities, such as presentations, tours and fun. The 2005 SULI program culminated in a student research poster presentation August 4, which was enthusiastically attended by scientists, staff and students.

The following comments are just two of the many positive thoughts expressed by both students and mentors about their experiences in the SULI program.



"The SULI program opened my eyes to diversity in the chemistry field as well as basic organic chemistry lab techniques that aren't always taught in the classroom. I worked alongside researchers, something I don't have the opportunity to do at the small school I attend. I am thankful for the brilliant interns, students, and staff I met this summer, and I am thankful for the opportunity the SULI program gave me to further my education in a way I never imagined."

~ Amanda DeVries (student with George Kraus)



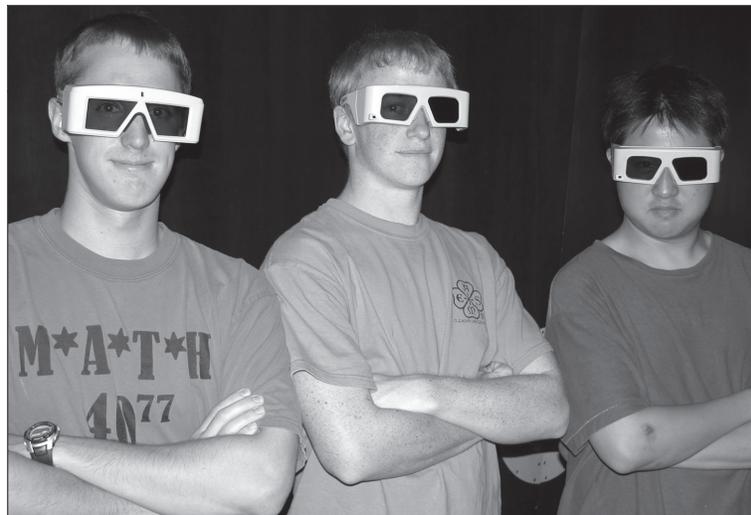
Travis Monk is asked a question about his research on photonic bandgap materials during the student poster session.

"My experience with the SULI program is colored (brightly) by the extremely high quality of the student, Shamus Cronin, that I worked with this summer. Shamus was the ideal prototype of a SULI student, willing and able to jump into the project that we designed and always friendly and positive. I only hope that he got half as much enjoyment out of his experience as I and my group members received during his stay at Ames Lab. His experimental results were of high (publishable) value and his careful analysis will help us to develop at least one new manuscript. My only complaint is that the program was too short. Sign me up again!"

~ Iver Anderson (mentor)



SULI students (left to right) David Sauer, Thomas Maloney, Amanda DeVries, Shamus Cronin, Andrew Shuff, Brian Langstraat and Chris Wong get taken out to the ballgame as part of the Ames Lab/IPRT employees trip to a Cubs game.



Brian Langstraat, Shamus Cronin and Chris Wong up their "cool" factor by donning the appropriate eyewear before entering the C6 virtual reality chamber.

Burning Up at the Old Ball Game!

Cubs outing was one hot evening

In spite of temperatures that hovered close to the 100-degree mark and energy-sapping humidity, the majority of people who had signed up for the Ames Lab/IPRT group outing to the Iowa Cubs baseball game on July 15 showed up to sizzle in the sun.

"I was sitting in a puddle of sweat. I couldn't move or breathe. There was no breeze – nothing. I thought I was dying," says Stan Bajic, associate chemist, recalling vividly his level of discomfort in the sun-drenched grandstand seats he and his friends occupied.

"I looked over at David (Baldwin) who looked up at the

sun and made some quick mental calculations. Then, he held up two fingers to the horizon, a Boy Scout signal he used to let me know that there were 20 minutes left until sundown. But it was more like 45 minutes before the sun finally set!"

Baldwin, Environmental and Protection Sciences program director, admits, "I did miscalculate, but it was a ballpark 'finger,'" he laughs, making an amusing play on words. "Twenty-two minutes later Stan was furiously pointing at his watch, demanding to know why the sun was still beating down. It was only 30 minutes later – 15 per finger – before the sun

started to set behind the stadium."

Bajic notes that the oppressive heat and humidity was at least tolerable once the sun had set for the day. "After that, the evening was

very enjoyable," he says. "The Cubs won, and the fireworks following the game were great." ■

~ Saren Johnston



Fly Ball

A group of Cubs fans try to follow a fly ball that was lost in the sun. See anyone you know?

Goodbye, Old Guy

It's only "down" now for Spedding elevator

The Spedding Hall elevator, installed when the building was constructed in 1950, has carried its final load. For more than half a century, the spacious elevator has faithfully hauled people, equipment and supplies from one floor to another at the touch of a button. But a recent, major failure in the elevator's automatic controls has grounded it for good.

A moment of silence, please.

According to Mark Grootveld, manager of Facilities Services, the old elevator can't be repaired without major cost and time delay, so it will be replaced.

"The equipment for the new Spedding elevator will be on site in approximately four weeks, and the contractor is scheduled to start shortly after that," says Grootveld. Facilities is investigating the possibility of expediting the start date but in the meantime Grootveld offers the following contingency plans for accessing the various floors in Spedding.

1. Basement access is available through the tunnels that connect to Wilhelm Hall and Metals Development.
2. Access to the ground-floor through third-floor levels is available through the TASF and Gilman Hall elevators.
3. For equipment that is too heavy or too large for the alternative routes, please contact Facilities Services at 4-3756.



So long... and thanks for the ride!

Anderson Escapes Serious Injury in Hit-and-Run Car-Bike Collision

A July evening spin on his bicycle took a scary turn for Iver Anderson when he was clipped by a car that was turning into Fredrickson Court. The accident threw Anderson to the ground, cracking his helmet and his left wrist. To make matters worse, the driver didn't even stop to see if Anderson was hurt. The car was later located and charges are pending against the driver for leaving the scene of an accident.

"I got a little banged up, but it could've been a lot worse," Anderson says. "It makes you realize how important it is to wear a helmet. Drivers also need to keep an eye open for cyclists."

The injury didn't slow Anderson down much. A few days later, he ran in the 10K event of the Midnight Madness road race.



Iver Anderson shows his fractured helmet and fractured wrist, the results of a bike-car accident.

Building Energy Focus of New IPRT Center

The Center for Building Energy Research, or CBER, officially became IPRT's newest scientific research center on July 1. "CBER is the only university center that focuses on energy issues related to all aspects of residential and commercial buildings, including thermal envelopes, building system operations, and energy efficiency related to industrial processes," says Francine Battaglia, center director and an associate professor of mechanical engineering at Iowa State University. Fellow mechanical engineering professor Michael Pate serves as the center's associate director.

The center actually began in 1992 and was run by ISU's Mechanical Engineering Department until its transfer to IPRT. "Affiliation with IPRT enhances CBER's ability to transfer technology that will benefit

the state of Iowa, and helps position Iowa to be a national leader," explains Battaglia. "In addition, IPRT's experience and long history supporting centers will enable CBER to expand and grow, while providing research opportunities as energy and environmental issues rise to the forefront of society."

The center brings together diverse technologies and fields across the ISU campus, including agriculture, atmospheric sciences, business and engineering. Research efforts cover energy efficiency and utilization; heating, ventilating and air conditioning systems and equipment; green building technology; alternative and renewable energy; and air quality.

VRAC to Study Virtual Control of UAVs

With a \$2.8 million grant from the Air Force Office of Scientific Research, James Oliver, director of IPRT's Virtual Reality Applications Center, is leading a team of researchers and graduate students, including Bryan Walter, Jared Knutzon, and Thomas Batkiewicz, who will develop technology that allows a single operator to monitor and control multiple unmanned aerial vehicles. Currently, it takes six people to operate one UAV — the pilot and five people on the ground. With future UAVs, the Department of Defense hopes to reverse the formula — one person on the ground to operate six or more unmanned vehicles. Over the next two years, Oliver's team will create the technology that allows a single, nonspecialist soldier to manage and command a swarm of unmanned aerial vehicles.

Oliver's research team plans to build a virtual ground control environment whereby operators can visualize unit positions, terrain, live video feeds and multiple information streams generated by other sensors. Remote-controlled planes, such as the Predator currently used by the military in Iraq and Afghanistan, are dif-

ficult to operate and limited mostly to reconnaissance work. By contrast, the next generation of unmanned aerial vehicles — the focus of Oliver's work — will have greater maneuverability and will carry more sophisticated weapons systems, making them capable of undertaking more dangerous missions. Oliver's research team will build a virtual ground control environment that will allow operators to visualize unit positions and terrain while also viewing live video feeds and multiple information streams from other sensors.

VRAC's C6 and C4 systems will also be used in research project aimed at improving children's survival rates during fire emergencies. With a grant from the U.S. Department of Homeland Security, Shana Smith, professor of industrial education and technology, leads a research team that will develop computer simulated models of fires within multiple-story apartments, houses and classrooms. Smith's VR models will be used to train Iowa children under the age of 14 how to safely escape a burning building.

PIPELINES Wins New NASA Funding

The Program to Increase the Pursuit of Education and Learning In Engineering, or PIPELINES, has received \$1.2 million in funding from NASA. The effort is a collaboration between Iowa State University and Southern University and A&M College of Baton Rouge, Louisiana. IPRT's Science Bound program will administer the grant.

"This latest funding will allow us to add new dimensions to our efforts and make a lasting impact," says Anita Rollins, Science Bound coordinator. The funding will sustain numerous education efforts, covering students from 7th grade through college. Programs for teachers, faculty, counselors and parents are also in the works. "We're aiming to remove any and all roadblocks that may prevent underrepresented students from studying science and technology and ultimately achieving a career in these fields," Rollins said.

One of the new efforts supported by the funding is a pilot program in Marshalltown, Iowa, which will lay the groundwork to extend the success of the Science

Massah Massaquoi extracts DNA during an Early Outreach Program lab held at Iowa State University by Science Bound.



Bound program to that school district. Another new component is called "NASA at ISU." Here, ISU, IPRT and Ames Lab researchers working on NASA projects will develop hands-on programs to allow middle school and high school students to participate in their research. A collaboration with a predominately Latino institution, Estrella Mountain Community College of Avondale, Arizona, will also be explored.

In other news, SB marked a record year with 33 Des Moines Public School students completing the program and qualifying for full-tuition scholarships to ISU in 2005.

Rollins Recognized as "Unsung Hero"

This May, the *Ames Tribune* honored Anita Rollins, IPRT's Science Bound coordinator as one of Mid-Iowa's Unsung Heroes. The award, given to seven Mid-Iowa citizens each year, recognizes those whose outstanding and selfless service to their community would otherwise go largely unnoticed.

Rollins was nominated for the award by Carlie Tartakov, director of ISU's Dialogues on Diversity, who praised Rollins for her efforts to make Ames a more diverse and welcoming place to live and work. "It is difficult to imagine one person who has made more difference in the development of a diverse community in Ames," says Tartakov. For nearly ten years, Rollins has coordinated Science Bound. "We feel we can never sing her praises enough," said Tartakov. "She is in fact what Unsung Hero is all about."

Rollins is characteristically modest about the honor. "I was given the opportunity to manage what was already a great program," said Rollins. "With the direction and guidance of many others I have tried to ensure the program's success, which is what I am paid to do."

IPRT Reaches Out to Iowa Industry

IPRT was a key participant in the Iowa State University Economic Development Open House, held July 13. More than 100 industry representatives and economic developers from Iowa came to Ames to learn about business and industry assistance services at ISU. IPRT's Deb Amenson, Tom Lograsso and Brian Larson held a session covering IPRT's no-cost technical assistance services. They explained how IPRT can help manufacturers address nonroutine, materials-related issues such as materials identification, metallurgical processes, and how NDE inspection techniques and procedures are developed and evaluated.

IPRT Company Assistance was also featured in a booth at the event's luncheon. The display included samples of products and projects from Iowa companies assisted by IPRT.

The IPRT LINK is published four times per year by the Institute for Physical Research and Technology at Iowa State University. Editor: Robert Mills. Contributors: Katherine Miles, VRAC; Alissa Anderson, communications intern. Please direct questions and comments to: Robert Mills, IPRT, 111 TASF, Iowa State University, Ames, IA 50011; rmills@iastate.edu.

Flights of Imagination

World Year of Physics program highlights planes and butterflies

The Ames Public Library's auditorium became both an airport and a butterfly garden Tuesday, July 12, when more than 70 fourth-through-sixth graders turned out to participate in "Keep 'em Flying!" The event was the latest World Year of Physics activity coordinated by Ames Lab's Office of Public Affairs.

John Jacobson, Iowa State University assistant professor of aerospace engineering, began the activities by giving a short presentation on the principles of flight. Oversize plastic insects then helped ISU entomology professor Donald Lewis discuss insect flight and its evolutionary advantages.

After the presentations, the children divided into groups and rotated through three different workstations. At the first station they decorated and put together paper butterflies whose wings flapped when the butterflies were moved up and down.

The next station, led by Lewis and entomology gradu-

ate students Laura Jesse, Patti Anderson and Jeff Bradshaw, involved folding brightly colored origami butterflies. A shadowbox full of winged insect samples was on hand to show the kids real-life examples of their crafts.

The third station proved to be the most active. There, helped by Jacobson and other volunteers, the children made paper airplanes and did some highly scientific "flight testing" by sailing them across the room! "I really liked the paper airplanes the best," said Jordan Stol. "You can fly them, and when you get good at folding, you can make really big ones!"

The activities culminated in a farthest-flying paper airplane competition. As dozens of colorful planes swooped through the auditorium, it was clear that the Ames Lab and ISU volunteers had helped these elementary school students discover the fun of physics. ■

~ Alyssa Anderson
student intern



Robert Wolterman, student employee in the Directors' Offices, demonstrates the fine art of folding paper airplanes as part of the volunteer crew that assisted with the World Year of Physics program at the Ames Public Library.

All-Hands Photo Oct. 4

Mark your calendars for Tuesday, Oct. 4, for an Ames Lab group photo in front of TASF. Please meet at 10 a.m. Rain date will be Wednesday, Oct. 5 — same time, same place.

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