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AMES LAB INSIDER

WORKING MAGIC - See Page 4

R&D Award Winner

The Ames Laboratory has won it's fifth R&D-100 award since 1984 from Research & Development magazine for having one of the 100 most significant technological innovations of the year.

This year's award was won for the Ames Thermite Process, a new thermite reduction process for making rare-earth-iron alloys developed by Rick Schmidt, principal metallurgist, David Peterson, metallurgist and John Wheelock, senior research technician.

Co-inventors of the Ames Thermite Process for producing rare-earth alloys for powerful permanent magnets are (l to r) Rick Schmidt, John Wheelock and David Peterson.

The thermite reduction process is a fast, simple, cost-saving method for making alloys to produce super magnets. Permanent magnets provide the energy field needed to convert electrical impulses into mechanical energy in the electric motors which fill businesses, homes and cars.

The trend is toward magnets made from alloys of iron and rare-earth elements, such as neodymium, since these materials have superior magnetic strength. Increased strength means a smaller magnet and thus, a smaller motor can do the work. The end results are smaller radios, computer disk drives or power tools and even, lightweight, more fuel-efficient cars.

Cutting costs and easing production of today's strongest magnets is the advantage of the new process. While traditional methods include purifying the individual elements before combining them to make the alloy, the new process skips the initial purification step.

The new thermite reduction process produces the desired rare-earth-iron alloy in a single, energy-saving step by taking advantage of the heat produced when calcium metal reacts with rare-earth metal fluorides and iron flouride. The heat from the reaction melts all of the material and allows the unwanted slag to separate from the useful alloy by gravity. When cooled, the two layers are simply broken apart.

"This process is easier, more energy-efficient and cuts manufacturing costs by about 20 percent," says Schmidt. "It's also more environmentally sound because of the process's ability to recycle unused materials. No other alloy process has this capability."

Already licensed to and in use by Ames Specialty Metals Division of Edge Technologies in Ames, this patented process could help U.S. magnet producers and users to become more competitive internationally. ❑

Gschneidner Honored

Karl Gschneidner, Jr, senior metallurgist and Distinguished Professor at Iowa State University, has been elected a Fellow of the American Society for Materials International (ASM).

The honor of Fellow recognizes the distinguished contributions made in the field of materials science and materials engineering. According to the citation, Gschneidner has been honored for "persistence, creativity and leadership in research on the physical metallurgy, magnetic and electronic nature of rare-earth materials." The title was conferred upon Gschneidner at the Convocation of Fellows held on October 9, in Detroit, Michigan.

"I feel deeply honored for being recognized by ASM. This award would not have been possible if it had not been for the hard work and efforts of my coworkers, and I would like to share this award with them as much as possible," he says with a smile. "I also appreciate the effort and time my coworkers and peers at other institutions put into making this nomination and supporting it."

His research interests include chemical and physical metallurgy, and solid state and low temperature physics of rare-earth materials.

Gschneidner has been honored at least six times during his career spanning more than 38 years, and twice during the current year. He was elected a Fellow of the Minerals, Metals and Materials Society, Warrendale, Pennsylvania last February. A veteran scientist, he came to Ames Laboratory as a student in 1952, and left after receiving his Ph.D. in 1957. He later returned as a metallurgist and group leader in 1963.

Karl Gschneidner

A prolific writer and editor-in-chief of the *Handbook on the Physics and Chemistry of Rare Earths*, Gschneidner has directed the Rare-earth Information Center at the Lab for the last 25 years. A successful science communicator, he has addressed a number of international science conferences worldwide and is involved in the dissemination of information about research and the application of rare earths.

"To be an effective science communicator, one should have a fairly good knowledge of the language. Such a person should be able to express science in a way others can understand, without using jargon," Gschneidner says, drawing upon his long experience.

Asked about his personal interests, Gschneidner says that he likes photography, collects postage stamps and enjoys classical and light music. He always has a radio or tape playing while in his office. He grows vegetables and fruits because he and his family enjoy the fresh-picked quality which is hard to find in stores. ❑

One More Award for Yeung

Edward Yeung, program director for Environmental Sciences and Distinguished Professor of chemistry at Iowa State University, has been selected for the 1990 Lester Strock Award.

The annual award recognizes the most significant publication in the field of spectroscopy during the last five years and honors Yeung for his creative and innovative studies into the fundamentals and applications of lasers in molecular and atomic spectrometry. The award was presented at the 17th Annual Federation of Analytical Chemistry and Spectroscopy Societies meeting held in October in Cleveland, Ohio. The award includes an honorarium of $500 and a medal.

Describing the award as a great honor, Yeung says, "It not only reflects work done by me as a scientist, but recognizes the research done by the students and other scientists in our group. This award recognizes the quality of research being done at ISU and should help attract more good students."

The research cited by the award concerns materials processing and composition of materials. This research has applications in various areas such as estimating fractures in airplane surfaces, thereby helping to prevent accidents, and finding impurities in semiconductor surfaces. Over the years more than half-a-dozen scientists and students have worked on this project. At present, two graduate assistants, one visiting scientist and one postdoctoral fellow in Yeung's group are continuing this research.

Among the eight awards Yeung has received, his most recent ones include the R&D 100 Award for excellence in technology transfer and one by the American Chemical Society in chemical instrumentation. The R&D Award recognized Yeung's polarimetric detector as one of the most significant technologies of 1987. The detector differentiates between free (good) cholesterol and bound (suspected culprit in heart disease) cholesterol forms. It is capable of analyzing various substances promptly and accurately using minute samples.

Edward Yeung

Yeung joined the Ames Laboratory and ISU in 1972. He received his bachelor's degree from Cornell University and his doctorate from the University of California, Berkeley.

He loves tennis, figure skating, violin, and chess. He was a member of the ISU Chess Club for a few years. "When time permits, my wife, our two children and I go on hobby jaunts." he says with a smile. Yeung is interested in looking at the scientific side of music. He is very interested in knowing the science behind the sound of the violin and the physical and chemical principles that go into making the instrument and its unique sound. ❑

Cy starts to grow as cold air is forced into the envelope bag.

Passengers and pilot climb aboard the balloon's basket. Ready for flight!

Making the Magic Work

When you see them floating peacefully across the Iowa summer sky, it seems nothing could be so light or move so effortlessly. They glide along with the wind, moving in silent majesty. Many of us have experienced the excitement of seeing a hot air balloon. We have strained our eyes to follow its progress until it slipped serenely out of sight returning to that magical fantasy land from which it surely must have come, only temporarily lost in our world of reality.

However, it is not magic that gets those regal and stately balloons up into the sky. What makes the magic work is a considerable amount of effort from some skilled people in the real world. Lowell Mathison, manager of Safety, Health and Plant Protection, knows this because he has crewed for Bill and Toni Woodman, the owners of the Iowa State balloon which proudly displays Cy and the Cyclone logo.

Mathison got into crewing quite by accident. In 1985 his son was asked by Toni Woodman, his homeroom teacher, if he would like to be a crew member for the Iowa State balloon. One day the crew was short a member so Mathison was asked to come along. That was the beginning. Now he crews about four to six times a year.

The balloon crew consists of the pilot, four crew members, and the crew chief who provides the training for new crew members. According to Mathison, the whole process of inflating the balloon takes approximately 15 to 20 minutes and requires a watchful and alert crew to carry out the required sequence of events. Upon arrival at their destination, the crew unloads the balloon and basket. The envelope bag (balloon) is strung out and the envelope support cables are connected to the basket. The fans are started and two crew members hold the mouth of the balloon open while cold air is forced in to start the inflation. After the envelope is fully inflated, the pilot lifts the basket up to a 45° angle, and the burners are then ignited. This is a tricky process because the heat must be kept away from the skirt at the mouth of the balloon. When enough hot air is in the balloon it will right itself. The fans and burners are turned off and the instruments are checked. The balloon is now ready to take on passengers. Once the passengers (two besides the pilot) have boarded, the burners are turned on again until enough hot air is created to lift off. The ride begins! Of course, this leads to the inevitable conclusion that it will also end.

"Landings," Mathison said, "are the second most memorable event of the whole experience." Apparently unaware that there could exist among the earthbound some degree of uncertainty as to whether floating 1000 feet in the air or landing safely was the more memorable event, Mathison continued. The landing is where the excitement begins for the ground crew members who are following the balloon in the chase vehicle. The pilot and crew chief maintain two-way radio contact. As the descent begins and the crew members in the chase vehicle are able to estimate where the balloon will land, they must hurry ahead and attempt to get permission from the property owner. Generally, this is not a problem as many property owners have the same fascination with hot air balloons that everyone else seems to have. Once the balloon has landed, postcards and balloon pins are handed out as thank yous and souvenirs. New acquaintances have been made and a lot of good will for the sport of hot air ballooning has been generated.

Lowell Mathison operates a fan to help inflate Bill and Toni Woodman's hot air balloon.

As is true of most sports, hot air ballooning has its own special ritual that is observed at the end of a person's first balloon ride. Mathison explained that the novice rider kneels to the ground and takes some earth in his or her hand while listening to the pilot recite the balloonist's prayer. The ceremony concludes as the new balloonist throws the handful of earth to the ground while simultaneously having champagne poured over his or her head! Thus, the new balloonist is baptized into the world of ballooning and all the wonder and thrills associated with the sport.

Ever since his first balloon ride that lifted off from the Ames High School playing field and flew over his house, Lowell Mathison has been hooked on the sport and says he will continue to crew for the owners of the Iowa State balloon as long as he is asked. During football season, when you see the Cyclone emblem floating in the sky above Jack Trice Field, chances are that Mathison will be one of the crew members whom Cy is smiling down on. ❑

Saren Johnston

The old Xerox 295 FAX machine used in the Office of Information is available to the group making the best offer. If interested, please call Dianne Borgen, 4-5635, with your proposal.

New Midway Contract Fares

Effective October 16, 1990

Des Moines to Washington, DC

$286 - 14 day advance purchase - non-refundable

$355 - 7 day advance purchase - 50% refund

Des Moines to Chicago

$230 - 14 day advance purchase - non-refundable

$297 - 7 day advance purchase - 50% refund

These fares are ONLY available when tickets are purchased at Travel and Transport. Please indicate Midway contract fare when making travel arrangements. **No Saturday night stay required.**

Travel and Transport has also worked out special fares with TWA. These fares are available only through Travel and Transport and only to Ames Lab/ISU employees. They are available for business or pleasure travel.

Ames Lab parking behind the Metals Development Building has been changed by the new driveway to Molecular Biology. Our lots behind MD are two lanes, one north and one south of the new drive. Overflow parking is available in the adjacent lot north of ours. Please observe the new traffic pattern and parking orientation.

Science not sorcery, admits Tom Lograsso, provides the ultimate answer to the alumina crystal mystery (last month's INSIDER). The "gene men" crystal clone was grown using the inductively coupled plasma (ICP) method in which ceramic powder is poured through a very high temperature plasma torch. As the powder passes through the torch to the pedestal, it becomes liquid. When the liquid reaches the pedestal where the temperature is cooler, it begins to solidify and a crystal begins to grow. The shape of that crystal is directly affected by the rate of flow of the powder through the torch and the temperature of the pedestal.

If the rate of flow of the powder is too fast or if the temperature of the pedestal is too high, a greater amount of liquid accumulates on the pedestal. The excess liquid flows outward resulting in finger-like projections instead of the uniform crystal shape desired. It was these projections which formed the arms of the gene men crystal clone. Reducing the rate of flow of the powder resulted in less liquid and a reduction in the diameter of the crystal which formed the head.

Imposing and supernatural as they seem, the gene men statues had little to do with the growth of their alumina crystal twin, or did they?

COMPUTER SECURITY

More on the proper care of diskettes as reprinted from *HP PROFESSIONAL* with permission of Professional Press, Inc., 101 Witmer RD., Horsham, PA 19477, November, 1989.

Diskettes are sensitive to jarring. Avoid dropping them on the floor, banging them around or placing them near anything that vibrates. Don't keep them next to the printer. Also, don't set your diskettes on top of the phone because when it rings, your data might be altered.

Normal use will eventually cause your diskettes to wear out (another reason to keep backups). Once in awhile, check the hub access opening of your most-used diskettes for signs of wear. When you buy blank diskettes, either buy those with reinforced hub rings or ask about hub rings that you can put on yourself. These will help to prolong the life of your most important diskettes. Also, check the oblong opening in your diskette's jacket for shiny rings forming on your diskette. Though this is actually a sign of disk drive problems, your diskette can be ruined and will need to be replaced.

When you buy software make backup copies of the diskettes. Store the original diskettes and use only the backups. Never store data on a program diskette.

Store a backup copy of your diskettes in another room or building, if possible.

Many people put off backing up diskettes until the day that one is erased with a week's work on it. Once this happens, you will never forget to backup a diskette again.

Renew your diskettes about every six months and re-backup the diskettes to refresh the data on them. The data and program on a disk tend to lose their magnetism after time. Renew the formatting at the same time.

Because of the 5 1/4" diskette's ability to flex and bend, it's sometimes referred to as a floppy disk. However, you shouldn't flex or mutilate the disk.

Never remove a diskette from the disk drive when the BUSY light is on.

Keep the diskettes stored at room temperature. Damage or loss of data may occur at temperatures exceeding 50F-125F or any humidity other than 10-80%. Never set diskettes on other appliances or equipment that may heat up during use; diskettes will warp. Once warped, they don't run properly in the disk drive and they can't be straightened – throw them out. Never leave the diskettes in a car in the sun. If you do happen to have the diskettes in one temperature extreme and transfer them to another temperature, wait 24 hours before trying to use them in your computer system.

When mailing a diskette, put corrugated cardboard on both sides (cut larger than the diskette) and label it "no bending", "no x-rays", "fragile", or "magnetic media". There are disk mailers available.

If you travel with your diskettes, keep them away from airport x-ray machines, as these machines give off harmful electromagnetic rays.

This concludes our discussion on "Caring For Your Diskettes." ❑

Ames Lab Student Employee Gets Scholarship

Angela Sellner, research helper in Bob Hofer's group, won the Phillips Petroleum Chemistry Undergraduate Scholarship for 1990. Sellner, a junior majoring in chemistry at ISU, assists Robert Hofer in the analytical chemistry lab in Metals Development.

Sellner's GPA and her work at the Lab were among the factors considered in her selection for the scholarship. "I came in second in my class," she says. "I pay my tuition to ISU by working here. During the summer I work full time and during the school year I work 15 to 17 hours a week. In addition to earning my tuition, I am also gaining experience in analytical chemistry."

The $1,000 scholarship was initiated to encourage women college students in science and engineering to pursue higher education. "By having a scholarship on my resume, it should be easier to win more scholarships and get a good job," Sellner concludes with a smile. ❑

Angela Sellner determines concentration of carbon in metals by using a combustion analysis.

Science Writer Joins Public Affairs

The Office of Information welcomes a new science writer, Pattye Volz, to its public information staff. Since June 30, Volz has been getting acquainted and learning about the research at Ames Laboratory.

The public information office is responsible for publications and media coverage of Laboratory research. A new quarterly science magazine will begin in January with Volz as the editor. This publication will include technical articles and other features designed to convey the breadth of the Laboratory and its scientific accomplishments.

Pattye Volz

Volz graduated from the University of Missouri's prestigious and nationally ranked journalism school. For the past four years, Volz has been communicating research news to the media, first at the University of Missouri and most recently at the University of Maine. Experienced in how to select appropriate projects and write in a style that interests the media, Volz has been successful in gaining coverage nationwide, including in the New York Times, the Wall Street Journal, Time magazine, CBS Evening News, and Cable News Network.

"The purpose of such media coverage is not for self aggrandizement," says Volz. "If we want government officials, legislators or the general public to know that our work is worthwhile and that basic research requires continued funding, we need to tell them. And media coverage can have more credibility in delivering that message than public relations literature clearly written by an organization to promote itself."

An effective public information program depends upon the internal flow of information. Scientists and program managers need to routinely inform the public affairs office about significant research projects and developments in their areas. Volz emphasizes that no information will be released until it has been approved by the researcher involved. "We want the message to be accurate and the timing of the announcement to be appropriate. It is important for us to have the information early enough so it can be written accurately and succinctly."

Expanding the Laboratory's science reporting should enhance public opinion of scientific research and the Laboratory, benefiting the scientist, the Laboratory and the DOE.

Originally from Tulsa, Oklahoma, Volz and her husband, David, are avid bikers and are excited about riding in next year's RAGBRAI. Volz has already ridden 2300 miles during this biking season and finds it a great way to relax. David is a veterinarian at the National Animal Disease Lab and has returned to school to work on his Ph.D.

"Volz's training and experience will greatly strengthen our program," says Burt Gleason, head of the Office of Information. "We are pleased to have her join our staff." ❑

Share Your Ideas!

Story ideas or news items are needed and welcome! Please call Pattye Volz at 294-5643 (quarterly publication, featuring science) or Dianne Borgen at 294-5635 (INSIDER, emphasizing people) or send to 201 Spedding Hall.

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