MATERIALS SCIENCE AND ENGINEERING DEPARTMENT

IOWA STATE UNIVERSITY

MSE ELEMENTS

Fall 2001
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Developing better coatings that BEAT THE HEAT

As high-temperature mechanical systems, such as advanced turbine engines, are pushed towards higher performance standards, they are also subjected to increasingly severe operating environments. Thermal barrier coatings (TBCs) coupled with advanced cooling schemes allow the current families of nickel-based superalloys to meet the materials needs of today's turbine engine systems. However, as materials researchers anticipate future improvements in gas turbine engines, such as higher operating efficiencies, longer operating lifetimes, and reduced emissions, they are looking to develop new or improved structural materials with inherently higher temperature performance capabilities that can be successfully incorporated into the next generation of TBC systems.

In two separate three-year Office of Naval Research (ONR) projects totaling over $700,000 in funding, MSE Associate Professor Brian Gleeson and Ames Lab Scientist and MSE Adjunct Assistant Professor Dan Sordelet are collaborating to investigate methods to fabricate or modify existing coating systems that can significantly enhance the performance level of TBC systems. Both projects started in 2000.

"A lack of reliability, more than any other design factor, is limiting the extensive commercial use of TBC systems for gas turbines," explained Gleeson. "Commercial advanced TBC systems are typically two-layered, consisting of a ceramic topcoat and an underlying metallic bond coat. The topcoat, which is usually applied either by air plasma spraying (APS) or electron beam-physical vapor deposition (EB-PVD), is most often yttria-stabilized zirconia (YSZ). The properties of YSZ are such that it has a low thermal conductivity, high oxygen permeability, and a relatively high coefficient of thermal expansion."

The YSZ topcoat is also made "strain tolerant" by depositing a structure that contains numerous pores and/or pathways. The high oxygen permeability of the YSZ topcoat provides the metallic bond-coat resistance to oxidation attacks. Thus the bond coat, which is rich in aluminum, forms a protective, thermally grown oxide (TGO) scale of α-Al_2O_3.

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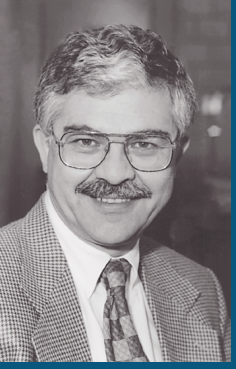
Brian Gleeson and Dan Sordelet are collaborating to investigate methods to fabricate or modify existing coating systems that can significantly enhance the performance level of TBC systems.

Dan Sordelet and Brian Gleeson in the Ames Lab Plasma Spray Facility



Greetings from the MSE department!

What an exciting and busy six months since the last ELEMENTS issue.

We started the academic year with several great events. Only a few days ago we witnessed the groundbreaking for Hoover Hall, the future home of the MSE department. We anticipate moving into the new facility in less than two years. Also within the past month, we received formal notification that the materials engineering curriculum has been accredited by ABET (Accreditation Board for Engineering and Technology). We knew the ABET visit went well, and the result confirmed our commitment and dedication to undergraduate education. Accreditation for ceramic engineering and metallurgical engineering were extended until all current students graduate from these programs. And finally, the recent placement report by ISU Engineering Career Services proved that our graduates are in high demand. The report shows that starting salaries for our B.S. graduates averaged $50.7K (highest in the College of Engineering), and that M.S. graduates averaged $60.1K, excluding the signing bonuses! With the quality of students we get and the quality of education we provide, this is no accident. I am confident that the job opportunities and demand for our graduates will be solid for years to come. We are very proud of our graduates and gratified that their new employers also value their potential!

The *Elements* issue you have in your hand gives you information on several exciting activities in the department. On the research front, the work of professors **Gleeson** and **Sordelet** on thermal barrier coatings is highlighted. This group is establishing a world-class research program on thermal barrier coatings and resistance to material degradation in aggressive environments. You will also note that we granted our first off-campus graduate degree to Ms. **Nicole Cavanah**. As some of you know, Nicole received her undergraduate degree from our department also. In addition to her full-time employment at Rockwell-Collins, Nicole is a member of the MSE Industrial Advisory Council and mother of a two-year-old daughter. Nicole commuted once a week from Cedar Rapids to Ames to pursue her master's degree. Our warmest congratulations to Nicole. Another interesting article features **David Eisenmann**, who, after nine years as a high-school teacher, decided to pursue a materials engineering degree. It is gratifying to hear from the perspective of an educator how satisfying it is to pursue a career as a non-traditional student. Finally, this issue offers testimonials from recent graduates about their experiences as students and their aspirations for the future. It is satisfying to see yesterday's students become today's engineers and tomorrow's leaders. Having the opportunity to facilitate this process is one of the most gratifying aspects of being an educator!

Mufit Akinc, Chair

Recycling magnetic scrap

MSE Professor **Scott Chumbley** and Associate Professor **Alan Russell** have discovered an economical and relatively simple method to eliminate waste in recycling tons of stockpiled magnet scrap, a by-product of high-energy neodymium-iron-boron magnets that are used extensively in automotive, consumer electronics, and biomedical applications. The recovery process, based on research pioneered and patented by Ames Lab researchers Tim Ellis and Rick Schmidt in the mid-1990s, involves immersing crushed Nd-Fe-B magnet scrap in liquid magnesium at 800˚ Celsius. The liquid magnesium leaches the neodymium from the scrap particles. The liquid magnesium solution can then be poured off leaving iron-boron particles behind. The resulting enriched magnesium alloy can be used as master alloy feed material for the magnesium casting industry.

Burning cleaner coal

A thin metal filter developed by MSE Adjunct Professor **Iver Anderson** and MSE Associate Professor **Brian Gleeson** may hold the key to vastly improving the coal-burning filtration process in electric power plants. Currently, the technology to burn clean coal involves the use of ceramic cylindrical "candle" filters that can trap fly ash particles as small as one micron. Accumulated fly ash is periodically knocked off by an internal blast of compressed air, a process called back flushing. However, back flushing poses problems when ceramic filters are used, where the abrupt change in filter operating temperatures (in the range of 850˚ Celsius) can crack the fragile ceramic material.

Anderson and Gleeson's research focuses on developing rugged metal filters from nickel-, cobalt-, and iron-based "superalloys" that have several advantages: airflow efficiency, strength at high temperatures, good thermal shock resistance, and the ability to develop a protective oxide scale. Their unique tap-densified loose powder sintering process converts high-purity molten superalloy metal into a fine powder using a high-pressure gas atomization system. The powder is then sorted, screened, spread out as a thin layer, and sintered to form the filter. The research is funded by a Department of Energy Fossil Energy Advanced Research and Technology Development program and is being conducted at the U.S. DOE Ames Laboratory on the ISU campus.

Research grant
fosters teaching and learning

When middle-school science teacher **Christi Taylor** returns to her classroom this fall, she will have some interesting summer experiences to relate to her students. Perchance, some of it may deal with the complexities of crystal formations and the capabilities of scanning electron microscopy. But, more likely, Taylor will eagerly share her excitement of a field of learning that she encountered during a four-week stint with the MSE department at Iowa State.

Taylor, from Waukee, Iowa, participated in a combined teaching/learning program made possible through MSE Assistant Professor **David Cann's** recent National Science Foundation Career Award. The interactive program, which comprised the education component of the NSF grant, aimed to accomplish two goals: encourage young minds to enter the domain of science and technology and establish a working relationship with secondary-school teachers to help them better understand career opportunities in the field of materials engineering to share with their students.

For two days a week, Taylor revisited her familiar role as teacher, developing a "hands-on" summer science program with a group of 8- to 14-year-olds from the Beloit Residential Treatment Center in Ames (a part of Lutheran Social Services). Using common household materials, together they constructed and learned about different crystal structures and explored minerals and their applications. Taylor spent the rest of her time getting acquainted with aspects of materials research, which included advanced instrumentation in the MSE labs. Taylor, who has an undergraduate degree in education, also engaged in a brief role reversal. During intense sessions with both faculty and graduate students, she learned basic concepts in materials science and engineering with the intention of reintroducing them to her students.

"They walked me through the process of making electronic ceramics. It was interesting to follow the process from the starting materials all the way to the finished product. I also got some exposure to freshmen engineering concepts by reading textbooks. This way, I'll be able to tell my students about what to expect," said Taylor.

What aspect of the project has been most appealing? "Working in the department has made me aware of the many opportunities in this field that I would especially like to take back to my female students," she said.

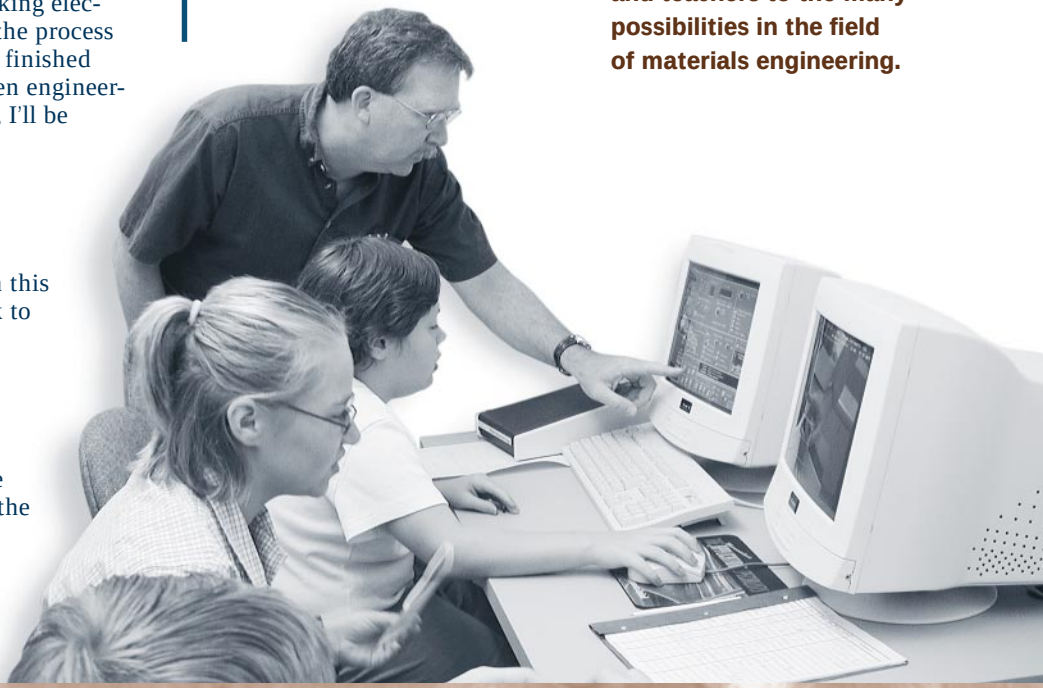
One way she plans to make this happen is to have Cann come and talk to students in her class. "This way the students can begin to develop some sort of relationship with the university and the subject matter. Although the material may be too advanced for them right now, it's a wonderful way to give them the exposure."

"Fast track curriculum"
launches engineering career

A materials science and engineering workshop in August 1998, conducted by faculty for K-12 teachers, was inspiration enough for high-school teacher David Eisenmann to seriously consider a career switch. After nine years of teaching high-school physics, Eisenmann enrolled as a MatE undergraduate student at ISU in fall 1999. Eisenmann is on a "fast-track curriculum," which means a previously earned bachelor's degree in agriculture from Iowa State University and a teaching certificate from Southern Illinois University qualified him to directly take core curriculum classes with a minimum of prerequisites.

While he concedes that the competition is intense, more so than ever before, it's sheer diligence, he says, that has seen him through many an academic challenge. Particularly, he notes, "when you take 300- and 400-level classes, there's a lot you have to teach yourself. If I hadn't had nine years of teaching, this would not have been possible." And yes, he would recommend going back to school to fellow educators. Being on the receiving end, he said, has taught him a lot more about learning. "It's not only a humbling experience, but I've gained considerable empathy for my former students!"

After graduating, Eisenmann is looking into the consulting field, where he hopes to utilize his engineering expertise as well as his vast experience as an educator. For the moment, though, he's busy finishing up course work and assisting advisor and MSE Professor Scott Chumbley in conducting K-12 outreach workshops that introduce students and teachers to the many possibilities in the field of materials engineering.



Taking the next step...

Last spring, as MSE undergraduates prepared for graduation, we contacted a few to learn more about where they're headed and how their chosen field of expertise is playing out in today's job market.

Our sampling revealed two important facts:

MSE students 1 are fanning out geographically to take up careers in a variety of fields, from professional consulting to industry to academics, and, 2 more importantly, their education has equipped them with the skills and confidence they need to make these diverse choices.

After completing a B.S. and an M.S. degree as part of a joint degree program in the department, **Jane Clayton** will pursue her doctoral degree at Penn State University. Her tuition, fees, and stipend will be covered for three years by a prestigious Department of Defense Fellowship. **Stephanie Connor** will be employed as a process engineer at 3M in Prairie du Chien, Wisconsin. **Kevin Sutherland** is off to Sacramento, California, to work for Accenture, a consulting company. **Gabriel Weigelt** will begin his career with Caterpillar in Peoria, Illinois. And **Alan Tkaczyk** is University of Michigan-bound to get his M.S. degree and eventually a Ph.D. in mechanical engineering with an emphasis in materials research. "I think the mechanical perspective adds a practical-oriented spin to the research," he said.

"The opportunities aren't as evident until you get out in the working world and see all the potential positions that would be suited for an MSE major," said Sutherland, who is confident that a job with Accenture will afford him "the chance to work with lots of people and in different positions." Connor admits she has been very impressed with the job opportunities. "After working so hard for four years, it's rewarding to see that there are companies that offer challenging positions."

Connor's optimism is well grounded. MSE's interdisciplinary approach, as well as a strong curriculum in fundamental materials knowledge and engineering processes, has given students the multifaceted skills they need to be competitive and marketable. "I think the program prepares students well for critical thinking and truly analyzing problems," remarks Tkaczyk.

In fact, Tkaczyk is convinced that MSE graduates on the job would do well to inform recruiters of the strong potential of incoming MSE students. "It needs to be an initiative of MSE graduates to make the name and need of our students more clear to recruiters from within companies or organizations."

Long-term plans span a plethora of aspirations and goals. Weigelt and Connor would like to pursue M.B.A.s and upper-management positions, while Sutherland speculates that his next course of action will depend on how well he enjoys the consulting business. "If not, I'll probably look into a company that makes fiber optic communication systems." Future ventures for Tkaczyk include becoming a leader in the international scientific research community. "My aspiration is to be involved in research at a university, or to start up my own company to develop innovative products." Clayton sees her future in academics in an environment where she can indulge her passion for research and teaching.

Years ago the engineering profession was considered to be "a man's world."

Although that's no longer the case, vestiges of the old attitudes, lack of role models, and other factors can dissuade young women from completing engineering degrees.

To help encourage ISU female engineering students to stay in engineering degree programs, the College of Engineering has joined MentorNet, a nationwide electronic mentoring program that connects women students with engineers working in industry.

Engineers from industry are already signing up to serve as mentors for the 2001–02 school year, and more are needed. Companies represented include IBM, Intel, Ford Motor, Microsoft, AT&T, U.S. Department of Transportation, Alcoa, HP, Los Alamos National Lab, and many others. If you are a working engineer, please consider serving as a mentor—you can sign up via the Web site (www.mentornet.net). There is no cost to either the student or mentor to participate.

Be a mentor to an engineering student

Questions? Contact—
Karen Zunkel, Manager
Engineering Undergraduate Programs
515-294-1684
kzunkel@iastate.edu

MSE grad earns M.S. on the job

So how does classroom knowledge translate into real-world industry applications? Just ask **Nicole Cavanah**, who graduated recently with a master's degree in materials science and engineering from the MSE department, while working full time as a ceramics and microelectronics packaging engineer with Rockwell Collins in Cedar Rapids, Iowa. Cavanah is an example of a growing trend among industry-bound undergraduates who are discovering that earning an advanced degree while pursuing professional goals can lead to a windfall of practical job-related benefits.

In 1996, when Cavanah graduated with a bachelor's degree from the department, she had just agreed to serve as an industry representative on MSE's Industrial Advisory Council. Pursuing a graduate degree, according to Cavanah, presented a unique opportunity to network with industry and academics to gain a better understanding of their expectations.

At Rockwell Collins, Cavanah was developing new packaging and interconnect solutions to reduce the size and weight of products as well as investigating new microelectronics packaging processes. Advanced courses in materials science along with hands-on experimentation and independent study projects steered Cavanah to a closer analysis of her work.

"Sometimes in industry we concentrate on solving a problem and then move on to the next without having a clear understanding of the basic science behind the problem. My class work helped me analyze my work experiences in more detail and understand the basic science," said Cavanah.

As an IAC representative, Cavanah was able to offer critical input into curriculum development issues, like including "the less tangible skills" of communication in project management and design issues along with an emphasis on technical knowledge. Again, Cavanah generated ideas to set up off-campus MSE graduate degree programs at industry sites, to save time and resources for both sectors.

Commuting once a week to campus with co-worker David Hillman, who was also pursuing his graduate degree, provided her with extra motivation. She cites the support of the MSE department as yet another major reason for her success. "Both faculty and staff will match your efforts in getting the most from your experience and education," she said.

Conversely, Cavanah's hard work has further solidified the department's strong relationship with industry representatives, who continue to assume active roles in hosting co-ops and interns and generating student design projects.

"My class work helped me analyze my work experiences in more detail and understand the basic science," said Cavanah.

Continued from page 1

Developing better coatings that BEAT THE HEAT

"It has been generally found that spallation and/or cracking of the thickening TGO scale is the ultimate failure mechanism of commercial TBCs, particularly EB-PVD TBCs," said Gleeson. "Improving the adhesion and integrity of the interfacial TGO scale is critical to the development of more reliable TBCs." This aspect comprises the central focus of the first ONR project.

"The durability and reliability of TBC systems is critically linked to the oxidation behavior of the bond coat together with minor elements that, with time, diffuse into the coating from the substrate during service," said Gleeson. "Ideally, within the TBC system, the bond coat should oxidize to form a slow-growing, non-porous, and adherent TGO." Gleeson and Sordelet are experimenting with different bond-coat compositions and structures and characterizing their oxidation performance during isothermal and thermal cycling tests. The interdiffusion behavior between the coating and the alloy substrate is another aspect that is also being investigated.

In their second ONR project, Gleeson and Sordelet are developing a simple, economical method to improve the salt-induced hot corrosion resistance of TBC systems. When sulfur from the combustion gas combines with sodium in the air to form sodium sulfate, it leaves a corrosive liquid deposit on the top coat of the TBC system. "Since the ceramic top coat contains inherent cracks necessary for strain tolerance, the liquid salt has a tendency to seep through to the bond coat, resulting in rapid degradation of the metal parts," said Sordelet.

It becomes necessary, then, to alter the top-coat chemistry of the system to enable it to resist salt-induced attacks. An APS coating system, available through the Ames Lab Plasma Spray Facility that is operated by Sordelet, is utilized to deposit coatings necessary for this investigation. The APS system is sufficiently versatile in that a range of top-coat modifications is possible.

Both projects involve interactions with researchers at Rolls-Royce Allison, Howmet, and the NASA Glenn Research Center. Commercial producers are always on the lookout for improved products, said Gleeson, but depend on research facilities like the MSE department and Ames Laboratory to conduct detailed study and experimentation.

At the 2001 MSE Spring Awards Banquet and Industrial Advisory Council Dinner, academic and professional excellence took center stage. Exemplary achievements of faculty, students, and staff were recognized by the presentation of scholarships and special awards.

MSE Awards Banquet

Scholarship Awards

Twenty-seven MSE students received scholarships in amounts totaling more than $25,000 thanks to generous contributions by MSE alumni, industry sponsors, and friends of the department. While one scholarship by an anonymous donor highlighted the long-time association of past MSE department Chair **David R. Wilder** and his wife Donna (who were present at the event), another invoked the memory of Frank McCutcheon III (MetE'69), who was killed in Vietnam but had arranged for his life insurance money to be used for a scholarship. Corporate sponsors included Deere and Company and the Square D Foundation. The department also honored its eleven National Merit Scholars, up from seven two years ago and ten last year.

The ceremony, held April 5, 2001, at The Hotel at Gateway Center (formerly the Holiday Inn Gateway Center), was attended by approximately 100 students, scholarship donors, parents of scholarship recipients, current and retired faculty, and engineering college Dean **James Melsa**, as well as special guests with strong ties to the MSE department.

Another highlight of the evening was a presentation on technology investments in the New Economy by keynote speaker **James Watson** (CerE'58). Watson retired from Texas Instruments in 1994 after 34 years of service. He currently serves as chairman on the board of several major corporations including E-Tron Incorporated, a supplier of wireless infrastructure for large real estate installations, and STARTech Technology, a business incubator that focuses on telecom, software, and semiconductor technologies. A recipient of the 2000 Marston Medal and the 1993 Professional Achievement Citation in Engineering (PACE) award from Iowa State, he chaired the ISU Engineering College Industrial Advisory Council between 1994 and 1998 and most recently was chairman of the MSE Industrial Advisory Committee between 1997 and 1999.

David R. Wilder Scholarship
Jonathon Goldie

Frank S. McCutcheon III Scholarship
Jon Ihlefeld

Square D Foundation Scholarship
Emily Kinser

Deere & Company Scholarship
Joshua Colyer
Kent Heitman
Kristin Johannsen
Michael Krashin
Rachel Neuendorf

Engineers Week Scholarship
Andrew Manning
Meagen Marquardt
Rachel Neuendorf
Justin Riney

Roderick Seward, Flossie Ratcliffe & Helen M.Galloway Scholarship
Michael Dau

Nelson Brothers Scholarship
Darrel Enyart

Oscar L. Bock Scholarship
Heath Walker

Otto & Martha Buck Materials Science and Engineering Scholarship
Jon Bolluyt

Murray Gautsch Scholarship
Robert Gall

Paul E. Morgan Scholarship
Amber Schneeweis

Arie & Catherine Breed Scholarship
Kent Heitman

Floyd Herman Cook Scholarship
Casey Harvey

David T. Peterson Scholarship
Bryan Baker

Frank X. Kayser Memorial Scholarship
Matt Cambronne

Samuel Walker Beyer Scholarship
Adam Buckalew

Materials Engineering Alumni Scholarship
Nathan Ashmore
Bryce Cambell
Shannon Dudley

College of Engineering Scholarship
Joseph Schramm

2001 MSE National Merit Scholars
Joshua Colyer
Drew Enlow
Jeffrey Leib
Justin Peters
Colleen Prosser
Michael Schmidt
Amber Schneeweis
Paul Stanley
Paul Tomlinson
Scott Williams
Benjamin Zimmerman

2000 Freshmen Scholarships
(given last fall to incoming freshmen)
Jon Bolluyt
Craig Bossard
Crystal Castro
Shannon Dudley
Casey Harvey
Kent Heitman
Aaron Johnson
Jennet Kramer
Jessica Raim

Department Awards

The department initiated a tradition this year of honoring the special achievements of its faculty, staff, and students. MSE Chair **Mufit Akinc** presented awards in the areas of student academic success, student leadership, teaching effectiveness, faculty research initiatives, and distinguished service to the department.

Outstanding Senior Award
Graduating seniors **Jane Clayton** and **Gabriel Weigelt** were cited for their outstanding achievements in academics and activities, as well as "high character . . . and the promise of continuing exemplary qualities as an alumnus or alumna."

Student Leadership and Service Award
Stephanie Connor was lauded for demonstrating outstanding leadership and service to the MSE department through her involvement in professional organizations and departmental efforts in recruitment, committee service, and planning.

Teaching Effectiveness Award
MSE Assistant Professor **David Cann** was recognized for several factors that go into receiving this award, which include developing innovative teaching techniques or methodology, effective application of information technology in the classroom, and receiving superior student evaluations, to name just a few.

Departmental Research Award
MSE Professor **Vladimir Tsukruk** was recognized for outstanding achievement in research and scholarship. The award particularly focuses on research leading to industrial applications and new initiatives that directly improve classroom teaching and bring recognition to the department.

Departmental Service Award
MSE Administrative Specialist **Carmen G. Neri** was praised for her superior service to the department. Her tireless efforts in facilitating the department's several activities in advising, recruiting, alumni and industrial interactions, and committee leadership was recognized as nurturing "excellent department citizenship."

Honors and Awards

Melissa Buechler
Graduate Student
Selected for the 2001 Graduate Student Researchers Program Fellowship, renewable for two additional years by NASA-Marshall Space Flight Center

Brian Gleeson
Associate Professor
International Advisory Board, Advanced Engineering Materials: Elected to be chair of the 2005 Gordon Research Conference on High Temperature Corrosion by attendees at the recent biannual Gordon conference on high temperature corrosion. He will act as vice-chair for the 2003 conference.

Matthew Kramer
Adjunct Associate Professor
Tom Lograsso
Adjunct Associate Professor
Dan Sordelet
Adjunct Assistant Professor
Outstanding Scientific Accomplishment Award, U.S. Department of Energy's Materials Science Research competition

Joshua Otaigbe
Associate Professor
Inventor Incentive Award

Keep us informed . . .

of your career moves, successes, honors and awards, and endeavors. *Elements* would like to include, in future issues, a section devoted to feature articles on alumni achievements and activities. So, help us seek out your special story! Just fill out the form below or complete it online at *http://mse.iastate.edu/people/post_it.htm*.

Name _____ E-mail _____

Graduation year, degree, student name *(if different from above)*

_____

Home address _____

City _____ State _____ Zip _____

Work address _____

Company, position _____

What's new _____

_____

I want to help the department by _____

_____

The MSE department also welcomes alumni donations. Your contributions help fund student facilities and projects, lab equipment, faculty teaching and research, and department activities.

Send your information to: **MSE Department, Iowa State University**
3053 Gilman Hall, Ames, Iowa 50011-3114
e-mail: mse@iastate.edu
fax: (515) 294-5444

Groundbreaking

On September 8, construction of ***Phase II of the Engineering Teaching and Research Complex*** was officially launched with a groundbreaking ceremony that took place at its future site near the Marston water tower. Guests at the ceremony included **Gary Hoover** (BSME'61) and **Donna Hoover**, whose $3-million gift gave impetus to the project, Iowa State University President **Gregory L. Geoffroy**, College of Engineering Dean **James L. Melsa**, and ISU Foundation Board of Directors Chair **Arend J. Sandbulte**.

MSE faculty, staff, and students anticipate moving to their new home about 18 months from now when the building is scheduled to be completed. The three floors of the building will be shared by the MSE department and engineering college undergraduate computer and research labs. The MSE department's administrative offices and much of MSE's teaching and research facilities will move to the new building, although MSE will retain its present space in Gilman Hall. The building will have 50,000 net square feet and will cost about $23 million to build. The construction progress can be viewed on the Web at www.eng.iastate.edu/etrc. Meanwhile, look for future *Elements* updates for an inside look into how the building plans shape up for the MSE department and its growing needs.

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Product development manager-Steelmill Division, Foseco, Inc. North America. Development of refractories for use in the continuous casting of steel.

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JOIN US IN INDIANAPOLIS!

Alumni Reception at the TMS Fall Meeting

TMS
Minerals • Metals • Materials

Tuesday,
November 6, 2001

6:00 - 7:00 p.m.
Downtown Marriott Hotel

2001 FALL CONFERENCE

Iowa Science Teachers

Thursday,
October 18, 2001
Polk County Convention Complex

MSE ELEMENTS
Vol.12, No. 1

VEISHEA 2001—The form for the Rice Krispies Treat was built by a team of volunteers from the College of Engineering led by MSE Professor Steve Martin.

World-record Rice Krispies Treat—2,480 lbs.

(From left to right) *Jennifer Roberts and Jalyn Briley, sister and daughter, respectively, of MSE staff member, Krista Briley, enjoyed the VEISHEA treat!*

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