Spring 2003

Mudslinger

A departmental newsletter for UMR-Rolla Ceramic Engineering Alumni and Friends

Chair's Message

Happy New Year, all, from UMR/MSM!

This has an eventful year for the Ceramic Engineering Department. We have had our share of ups and downs, rewards and challenges. New faculty, award winning students, budget cuts and accreditation battles, new courses, new research, where do I begin?

Faculty News

Let's start with the faculty. Our newest faculty members are in place and contributing to our education and research missions. **Fatih Dogan**, late of the University of Washington, is now teaching the junior-year labs and has picked up one of our new grad courses (Cer477: *Atomic structure in solid-state materials*). Fatih continues his ceramic superconductor research and has taken the responsibility for our satellite site for the NSF/University /Industry Center for Dielectric Studies. **Robert Schwartz**, formerly from Clemson University, has taken responsibility for teaching our undergrad courses on electronic materials (Cer284 and Cer333) and will pick up our introductory course on crystal structures (Cer102). Bob's research programs involve piezoelectric and dielectric materials. This fall, **Jeff Smith** began a tenure-track position in the department. Jeff was a research faculty member for the previous ten years and he has developed a reputation as one of the nation's leaders in the development of refractory and structural materials. He'll continue that valuable research and he will teach courses on phase diagrams (Cer251) and refractories (Cer364) and he is leading our senior design course.

Darrell Ownby retired from teaching this spring, after 34 years of service to the department. Darrell taught Phase Diagrams and Thermodynamics, among other courses, for many years, developing these core skills for hundreds of UMR ceramic engineers. Twenty-six graduate students earned their degrees under Darrell's leadership, the last PhD. defending in December 2002. Darrell and Nina will remain in Rolla and look forward to spoiling their grandchildren. **Doug Mattox** will also retire at the end of this coming semester, after thirteen years at UMR. Doug has played an important role in our undergraduate programs, as a teacher and an advisor, and he was instrumental in the expansion of the alumni development funds that are so important to our students. Doug and Marie also plan to remain in Rolla where they will participate in church and community activities and also spoil the grandkids.

Program News

Every six years, the department undergoes evaluation by Accreditation Board for Engineering and Technology (ABET) and 2002 was once again 'our year'. The evaluation team was complimentary, but identified some areas for improvement. In particular, we need to ensure that our curriculum remains flexible to best prepare our students for engineering careers. The alumni survey enclosed with this newsletter is one important way we determine if we are teaching our students what they will need to thrive as engineers. As alumni of the program, you are in the best position to know what courses and academic experiences are most valuable to new engineers.

Also affecting our curriculum is the campus drive to a 128 hour standard for engineering degrees. There are discussions now ongoing to reduce Calc I and II from five to four hour courses and to change the freshman chemistry requirements. The ceramic engineering department is considering dropping P. Chem 2 from our curriculum and replacing Quant (Chem 251) with a new materials analysis course developed by **Bill Fahrenholtz**. (I can hear you alumni yelling- "Why didn't you do this when I was there!") We are planning new courses on processing and thermal properties of ceramics and will pick up a course on engineering economics. A comparison of the present and proposed curriculum is shown on page 4 .

One other interesting result from our preparation for the ABET visit was our review of the placement of students who received BS degrees in ceramic engineering. Since 1997, at least thirty-nine different companies have hired our engineers. MEMC and Motorola have hired the most over that span (four each), and at least ten companies, including Coorstek, Howmet Corp., Kohler, Litton, Owens-Corning, and Saint Gobain, have hired at least two. About 50% of our undergrads have elected to pursue advanced degrees in recent years, at UMR and other universities around the U.S., including MIT, Penn State, Georgia Tech, Florida, Univ. California-Berkeley, Michigan, and Illinois. Industry has also been very generous in their support of our co-op and intern programs. Companies that have recently provided valuable training for our undergrads include Kohler, Pratt & Whitney, Certain-Teed, Argonne National Lab, Honeywell, MEMC, PPG, Schott Glass, and others. In recent years, when jobs have been tight, we have found that those students who have co-op and intern experience are having the greatest success finding entry-level positions. If your company offers co-op positions, keep our students in mind.

Campus News

Overall trends on campus are very promising. Total stu-

dent enrollment on campus is up (and has been for several years). **Jay Goff**, Dean of Enrollment Management, has done a terrific job recruiting high quality students to UMR. (The average ACT score for an incoming freshman is now 27.4, one of the highest in the country.) Research activities are way up, too, thanks in great part to that part-time Ceramic Engineer, **Wayne Huebner**, now firmly ensconced as Vice Provost for Research. Wayne led this department to national acclaim, and now he's drawing on his energy and enthusiasm to do the same for the University.

This positive news, however, has in many ways been superceded by bad budget news from the State. The university budget was slashed by 10% last spring and there is no chance that those cuts will be made up any time soon. (By some analyses, the State of Missouri took larger cuts from higher education budgets than any state in the US- sometimes you just don't want to be #1). The University imposed a salary freeze for all employees and raised student fees by over 15%. To help reduce the campus budget deficit, the department was forced to return nearly all our discretionary funds, normally used to support our education and research activities. We also had to reduce the value of scholarships distributed to our undergrads. (The latter reduction was not as severe this year as last, thanks in part to your generosity during the last phon-a-thon and to a record level of research contracts by our faculty that returned important funds to the department.)

The budget problems have generated much discussion on campus and in Columbia this year about the future of small departments in the University of Missouri system. Much of the local discussion centered on the consolidation of the Ceramic and Metallurgical Engineering departments into a larger Materials Engineering Department. Cooler heads seem to have prevailed and the talk of consolidation has subsided, for now.

So- where do we stand? Overall- I think we are in pretty good shape. Departmental enrollments are starting to pick up again- presently have 55 undergrads and 35 graduate students enrolled. Research productivity has never been higher- over $2.5M in expenditures last fiscal year, far and away the highest per capita research total on campus. Our students, faculty and alumni have received much acclaim this past year. (Many of these highlights are described elsewhere in the *Mudslinger*.) Challenges remain but our enthusiastic faculty and excellent students and supportive alumni will, as always, ensure that those challenges are met.

Phonathon Dates: February 25-27 and March 2-3, 2003

Phon-a-thon Results

In 2002, 166 alumni donated $21,463 to the department through phon-a-thon pledges, an average gift of $128. Thank you for your generosity! These funds were used to provide scholarships to incoming freshmen, through the Ceramic Engineering Alumni Endowment Fund, and to support activities associated with our undergraduate teaching efforts. Despite problems on Wall Street and pressures on industry, your commitment to the department has been outstanding. This year, our phon-a-thon will be held between Feburary 25th and March 3rd. As in the past, our students and faculty look forward to speaking with our alumni and we thank you (in advance) for your continued support.

Hilmas wins 'Oscars of Invention' Award

Greg Hilmas, assistant professor of ceramic engineering, received one of *Research and Development Magazine's* 2002 R&D 100 awards, also known as the "Oscars of Invention" and the "Pulitzer Prizes of Technology," on October 16, in Chicago.

Greg and his colleagues from the Massachusetts Institute of Technology, the University of Michigan and Advanced Ceramics Research Corp. won this award by creating fibrous monolithic ceramics. This type of ceramic is more flaw-tolerant and resistant to damage than traditional ceramics.

With the use of traditional monolithic ceramics, "If you drop a coffee mug on the floor, or place it in a freezer for some time and then fill it with a hot beverage, the mug will shatter due to the drop or rapid temperature change," says Hilmas.

A mug made with the patented fibrous monolithic ceramic, however, would act more like wood and metals, chipping and denting instead of shattering.

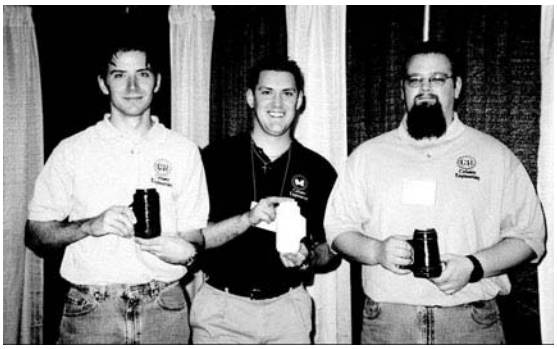
Practical applications of this material include cutting tool inserts for precision metal machining, drill bit inserts for oil and gas drilling, and high-temperature applications such as jet engine components, hot gas valves, nozzles and thrusters.

Alumni Awards

We were pleased to welcome a number of alumni back to Rolla to receive awards this past year. **Ray Jones** ('46) received a professional degree at the May 2002 commencement. **Bill Carty** ('85) and **Dan Krueger** ('94) received 'young alumni' awards from the MSM-UMR Alumni Association during Homecoming in October. Bill is now an Associate Professor of Ceramic Engineering at Alfred University, where he also directs the Whitewares Center. Dan is an engineer at Honeywell. **Ellis Smith** ('55) received a professional degree at the December 2002 commencement.

Student Group News

Our student groups remain as busy as ever. Members of *Keramos* and the student branch of the American Ceramic Society regularly meet with high school students visiting campus, performing demonstrations and answering questions about ceramic engineering. The students have been involved in several local charitable activities and they organized the Homecoming bar-b-que this fall. Finally, the student groups enjoyed great success in a number of activities held in conjunction with the annual meeting of the American Ceramic Society in St Louis in April 2002. **Natalie Vanderspiegel** (pictured above), a senior from Richton Park, IL, became the first winner from UMR of the Student Speaking Contest since **John Halloran** ('73). Our design teams took the top three spots in the mug drop competition, placed second in the ceramic putter competition, and our Keramos chapter finished second in the 'chapter of the year' competition. (The mug droppers, **Adam Chamberlain**, **Doug Legel** and **Jeremy Watts**, are pictured below.) The student design teams succeeded in great part because of the generosity of **Ellis Smith** ('55). Funds from the *Ellis & Carolynn K. Smith Family Endowment* were used to build a furnace and support the production of the items the students entered in last year's competitions. Thanks again, Ellis!



The *St. Louis Section Symposium* on Refractories will be held on April 9-10, 2003 at the Hilton St. Louis Airport Hotel. The topic of the symposium is "Monolithics-Precast Shapes, Installation, and Raw Materials".

Further information will be posted at a later date on the ACerS website (http://www.acers.org/membership/), issues of the Bulletin or you can contact Patty Smith at psmith@umr.edu or phone (573) 341-6265.

Recruiting a New Generation of Ceramic Engineers

The *Associated Glass and Pottery Manufacturers Association* (AGPMA) awarded a one-year grant to the department to allow our students to develop kits that will be used by high school science teachers to promote interest in ceramic materials to their students. The kits will contain all of the materials and supplies needed for high school teachers to perform experiments and controlled demonstrations that illustrate important scientific principles in an entertaining manner. Laboratory exercises based on slip casting and glassmelting have been prepared for the kits. These hands-on activities give a basic understanding for what ceramic materials are and how they are produced. They emphasize the application of science (chemistry and physics) to form common raw materials into useful products. Included with each kit will be a DVD with further information about ceramic materials and about ceramic engineering at UMR.

Would you (and your company) like to be part of this effort? We would love to receive from you electronic images of ceramic engineers (especially alumni) in action- pictures or video clips- as well as images (and real samples) of ceramic materials and components, to use in the DVD or to distribute with the kits. If you'd like to participate (or if you have any questions), please contact **Bill Fahrenholtz** (billf@umr.edu).

ALUMNI DINNER

There will be an alumni dinner held on Monday, April 28, 2003 at the American Ceramic Society Annual Meeting in Nashville, TN. The cost will be $25.00 per person and you MUST prepay in order to attend. **The deadline for registration for the dinner will be April 21, 2003.** We will not be having a exposition booth at the convention this year so be sure to mail your registration before the deadline. Registration form is included in this newsletter and also on our website at: http://www.umr.edu/~ceramics/newsletter.html.

The dinner will start at 7:00 pm. Your choices for dinner will be: 10 oz. Prime Rib; Brown Ale Chicken (pan-seared chicken breast topped with a creamy Brown Ale sauce); Salmon (flame grilled and seasoned with a rich dill butter sauce); or Penne Al Fresco (penne pasta tossed with smoked Roma tomatoes and a four cheese cream sauce).

Hope to see you there!!

The Ceramic Engineering Department is reviewing our curriculum and is considering some changes. Listed here are the present curriculum (after the freshman year) and the one we are currently considering. Some significant changes include dropping Chem 243 and replacing Chem 251 with a new course on ceramic characterization (Cer 291/2), replacing Met 204 with a new course on thermal properties of ceramics, replacing Cer 205 with an 'engineering business' course from the EMan department, replacing Cer 315 (Organic Additives) with an expanded Ceramic Processing course (Cer 331), and expanding our lab offerings to include more communications activities (report writing, student presentations, etc.). We would very much appreciate hearing from you what you think about these changes. Contact Richard Brow at brow@umr.edu with you're your comments and suggestions.

Present Curriculum

Semester 3:
Cer102: Atomic Structure of Crystals- 3hrs
Cer104: Ceramics in the Modern World- 3hrs
Cer111: Ceramic Materials Lab I- 1.5 hrs
Math 22: Calc III- 4 hrs
Phys 24: Engineering Physics II- 4 hrs
H/SS Elective[a]- 3 hrs

Semester 4:
Cer103: Introduction to Glass- 3 hrs
Cer122: Ceramic Materials Lab II- 1.5 hrs
Math 204[b]: Differential Equations- 3 hrs
BE 50: Engrg. Mechanics/ Statics- 3hrs
H/SS Elective[a]- 3 hrs
H/SS Elective[a]- 3 hrs

Semester 5:
Cer203: Thermal Processes in Ceramics- 3 hrs
Cer205: Engrg. Design Process- 3 hrs
Cer231: Ceramic Processing Lab I- 1.5 hrs
Cer251: Phase Equilibria- 3 hrs
Chem 241: Physical Chemistry I- 3 hrs
Chem 251: Quantative Analyses- 4 hrs

Semester 6:
Cer242: Ceramic Processing Lab II- 1.5 hrs
Cer259: Ceramic Thermodynamics- 3 hrs
Phys 107: Introduction to Modern Physics- 3 hrs
Chem 243: Physical Chemistry II- 3 hrs
BE 110: Mechanics of Materials- 3 hrs
H/SS Elective[a]- 3 hrs

Semester 7:
Cer261: Ceramic Engrg Design Lab I- 1.5 hrs
Cer284: Electrical Properties of Ceramics- 3 hrs
Cer306: Thermomech. Props. & Design- 3 hrs
Cer362: Ceramic Properties Lab- 1 hr
Met204: Transport Phenomena- 3 hrs
Tech Elective[c]- 3 hrs

Semester 8:
Cer262: Ceramic Engrg Design Lab II- 1.5 hrs
Cer315: Organic Additives in Ceramic Proc.- 2hrs
Engl. 060, 160 or Speech 85- 3 hrs
Tech Elective[c]- 3 hrs
Tech Elective[c]- 3 hrs
Statistics Option[b]- 3 hrs
134 total hours w/ freshman engineering

Proposed Curriculum

Semester 3:
Cer102: Atomic Structure of Crystals- 3hrs
Cer104: Ceramics in the Modern World- 3hrs
Cer111: Ceramic Materials Lab I- 2 hrs
Math 22: Calc III- 4 hrs
Phys 24: Engineering Physics II- 4 hrs

Semester 4:
Cer103: Introduction to Glass- 3 hrs
Cer122: Ceramic Materials Lab II- 2 hrs
Math 204[b]: Differential Equations- 3 hrs
BE 50: Engrg. Mechanics/ Statics- 3hrs
H/SS Elective[a]- 3 hrs
H/SS Elective[a]- 3 hrs

Semester 5:
Cer203: Thermal Processes in Ceramics- 3 hrs
Cer231: Ceramic Processing Lab I- 2 hrs
Cer251: Phase Equilibria- 3 hrs
Cer291/2: Characterization of Ceramics- 4 hrs
Chem 241: Physical Chemistry I- 3 hrs

Semester 6:
Cer242: Ceramic Processing Lab II- 2 hrs
Cer259: Ceramic Thermodynamics- 3 hrs
Phys 107: Introduction to Modern Physics- 3 hrs
BE 110: Mechanics of Materials- 3 hrs
H/SS Elective[a]- 3 hrs
Statistics Option[b]- 3 hrs

Semester 7:
Cer261: Ceramic Engrg Design Lab I- 2 hrs
Cer284/5: Elec. Properties w/ lab- 4 hrs
Cer306/7: Mech. Properties w/ lab- 4 hrs
EMan320: Tech. Entrepreneurship- 3 hrs
Tech Elective[c]- 3 hrs

Semester 8:
Cer262: Ceramic Engrg Design Lab II- 2 hrs
Cer331: Ceramic Processing- 3 hrs
Cer3XX: Thermal properties of Ceramics- 3 hrs
Tech Elective[c]- 3 hrs
Tech Elective[c]- 3 hrs
129 total hours w/ freshman engineering

[a]Eighteen hours of H/SS electives now, fifteen hours proposed

[b]Students can opt for Math 204 and one statistics course, or two statistics courses w/o Math 204.

[c]Nine hours of tech electives, 200-level or higher

Glass Beads in the News

Delbert Day ('58), Curator's Professor Emeritus of Ceramic Engineering, has been all over the news for his work on radioactive glass beads (TheraSpheres) used as a treatment for liver cancer. Delbert and his grad student, Xue Han, grace the cover of the most recent edition of the *MSM-UMR Alumnus* magazine, and feature-length articles on this work have appeared this past year in the *St. Louis Post-Dispatch* and the *Springfield News-Leader*. Copies of these articles can be found on the department's website at http://www.umr.edu/~ceramics. (The Winter 2002 edition of the *MSM-UMR Alumnus* magazine has several other mentions of biomaterials-related research ongoing within the department, including **Len Rahaman's** work on hip implant materials and **Greg Hilmas's** development of a new, adjustable intraocular implant design.)

Faculty News

Dr. Harlan U. Anderson, Curators' Professor Emeritus

Currently still Director of the Electronic Matls. Research Center (EMARC) and working on research in the area of fuel cells.

Dr. Richard K. Brow, Professor and Department Chairman

I have enjoyed working with my students and colleagues on a variety of glass research projects this past year. **Carol Click** (now with Schott Glass Technologies) finished her PhD on a project with Lawrence Livermore National Lab to investigate the incorporation of platinum into phosphate laser glasses. **Brad Tischendorf** continues our association with LLNL, pursuing a PhD on a project to characterize the corrosion susceptibility of the laser amplifiers. **Nate Lower** is working on a PhD project funded by the *Center for Glass Research* to characterize the strength and fatigue behavior of glass fibers. Other students and colleagues have worked on projects to develop sealing glasses for a variety of applications, to characterize the crystallization behavior of dental glass-ceramics, to prepare and characterize novel rare-earth phosphate glasses, and to study the corrosion of borate glasses with possible biomaterials applications.If you would like to discuss this reserach or the activities of the department, please contact me at brow@umr.edu

Dr. Delbert E. Day, Curators' Professor Emeritus

The use of TheraSphere, the radioactive glass microspheres used to treat patients with primary liver cancer, continues to expand and patients are now being treated at 10 sites in the US (Baltimore, Pittsburg, Detroit, Irvine CA, Tampa, Clearwater, Philadelphia, Phoenix and Winston-Salem). The plan is to have about 6 more sites in the US in operation by April 2003. Patients are now receiving multiple injections of the radioactive glass microspheres when needed and a small number of patients have successfully received up to three injections. Persons interested in more information can find hundreds of articles by searching on Google.com and entering the word TheraSphere.

Congratulations are due the several students in my glass research group who have completed their graduate degrees in 2002——**Kenan Fears**, MS in CerE, **Robert Leerssen**, MS in CerE, **Kisa Ranasinghe**, PHD in Physics; and **Tihana Fuss**, MS in CerE. Good luck to them all.

Other graduate students continue to conduct research in (a) biological applications of glasses (long term drug delivery, hydroxylapatite microspheres for HPLC applications and bone repair, and glass microspheres for in-vivo radiation delivery), (b) nucleation and crystallization in glass as dependent upon gravity and shear thinning (planning two experiments on the International Space Station for NASA), (c) iron phosphate glasses for vitrifying nuclear and hazardous wastes and (d) glass microspheres for tagging explosives. If you know some good graduate student candidates, suggest they consider UMR.

Dr. Fatih Dogan, Professor

Since joining the Ceramic Engineering Department at UMR in spring 2002, one of my first observations was the pleasant harmony and close interaction of the students with the faculty and staff. It was impressive to see how well organized and enthusiastic the students were in supporting the American Ceramic Society and Keramos through active participation. Not surprising that the UMR students have been very successful at the annual meetings of the society and received various awards and honors.

The strong tradition and reputation of the department are preserved not only by the hard work of the people in the department, but also by the active support of the alumni. I met many of you at the fall meeting of the St. Louis Section of the ACerS in the historical winery of Herman. Such meetings where thoughts on our educational goals and business opportunities exchanged are vital towards maintaining and refreshing the ties between the alumni and the department.

In fall 2002, my teaching duties involved a course on "Ceramic Processing Laboratory" and jointly offered courses on "Ceramics in the Modern World" and "Atomic Structure in Solid State Materials". The current research activities in our group are focused on the processing/microstructure/property relationships of electronic ceramics, such as dielectrics, high temperature superconductors and solid oxide fuel cells. Along these research directions, I have been assuming some of the responsibilities for student advising and research programs from Harlan Anderson and Wayne Huebner (now Vice Provost for Research).

Another important event of our multidisciplinary research

efforts in this fall was hosting the semiannual meeting for "Center for Dielectric Studies", a National Science Foundation Multi-university Industry/University Cooperative Research Center, jointly with Penn State University first time on UMR campus. We look forward to having a fruitful collaboration between the industry partners worldwide and the members of both universities within the CDS of NSF.

Your comments are always welcome to better prepare our students for the future. Greetings from UMR! doganf@umr.edu Ph: 573-458-4393

Dr. Bill Fahrenholtz, Assistant Professor

This past year has been an exciting one for me. I have continued to teach the sophomore lab classes (Cer. Eng. 111 and 122) and undergraduate thermodynamics (Cer. Eng. 259). I worked with **Professor Van Aken** from the Metallurgical Engineering department during WS 2002 to create a new graduate class covering thermodynamics, kinetics, and diffusion (Met. Eng. 478), the second core course for our new M. Eng. in materials degree program. In addition for FS 2002, I resurrected the x-ray diffraction class and lab (Cer. Eng. 391/392), which will replace quantitative analysis (Chem. 251) in our curriculum. I have continued to work with Worldwide Youth in Science and Engineering (WYSE) to expand their Academic Challenge high school math and science competition in Missouri. We held the first Missouri state finals competition at UMR on April 8, 2002. We successfully hosted ~150 high school students from around the state for that event. I am currently acting as the WYSE Missouri Coordinator and sit on the Board of Advisors for the WYSE organization. This has also been an exciting year for my research. **Professor Greg Hilmas** and I have been notified that we will be awarded a research contract from the Air Force Office of Scientific Research to examine "Reactive Processing and Co-Extrusion of Ultra-High Temperature Ceramics." **Professor Jeff Smith** and I were awarded a contract by the Department of Energy to work with Pyrotek to produce improved refractories for the aluminum industry. I have also continued my collaboration with **Professors Jim Stoffer, Tom O'Keefe, Matt O'Keefe, and Tom Schuman** on cerium-based coatings for corrosion protection of aluminum. This year, I had one M.S. student graduate, **Shyam Menon**, and he has taken a job at Fuel Cell Energy, Inc. in Danbury Connecticut. I currently have two graduate students (**Adam Chamberlain** working on ultra high temperature ceramics and **Vaidehi Dongre** working on cerium coatings) and would like to hire two more (anyone interested?). This past August, I was honored with an invitation to present my work on reaction-based forming of ceramic-metal composites at one of the prestigious Gordon Research Conferences. I spoke at the Gordon Research Conference on High Temperature Materials, Processes, and Diagnostics. I was also pleased to be voted "Outstanding Professor" by the Ceramic Engineering undergraduates for the second year in a row.

Dr. Greg Hilmas, Assistant Professor

Well, it was another banner year for the Hilmas research group and we are having a great time. Well, I am at least! The size of my research is getting a bit out of control. It now consists of one research scientist, seven graduate students and five undergraduate students. I guess that you could call 2002 the "Year of Awards". Thanks in large part to the efforts of my research group, as well as the efforts of my other colleagues around the country, I received a Faculty Excellence Award from UMR and an R&D 100 Award from R&D Magazine. I was also presented with an Outstanding Teaching Award in 2002 from UMR and the 2002 Alumni Excellence in Teaching Award from UMR's Alumni Association.

I still have a diverse group of exciting R&D activities happening in my research lab including the development of cermets for cutting and drilling tools, multilayered ceramic capacitors for high energy density dielectrics, solid oxide fuel cell substrates, water-jet cutting nozzles, ultra-high temperature ceramics for thermal protection systems in the aerospace industry, and focusable intraocular lenses for the human eye. The group now consists of **Mr. Tieshu Huang** (Research Scientist), **Dustin Beeaff** (Ph.D. student), **Xilin Xu** (Ph.D. student), **Sean Landwehr** (M.S. student), **Jeremy Watts** (M.S. Student), **Adam Chamberlain** (Ph.D. student co-advised with Dr. Fahrenholtz), **Ju Bao** (M.S. student co-advised with Dr. Joe Newkirk in the Met. Dept.), and **Michael Matthews** who just finished (HOORAY) and graduated in December with his M.S. and is now working for Rubicon Technology in the Chicago area. Two new graduate students will also start in January of 2003, **James Zimmermann** (coming from Minnesota to work on his M.S. with myself and Dr. Fahrenholtz) and **Amanda Young** (B.S. Ceramic Eng., Dec. 2002 from UMR). I look forward to another great year in 2003, and hopefully Xilin and Dustin will have graduated the next time I write this message (I sure hope that they read this)!

Dr. Wayne Huebner, Professor & Vice Provost

Dr. Huebner has been very busy with his duties as Vice Provost for Research Services, but still finds time to advise his graduate students working on electronic materials research. If you'd like to give Wayne a hard time about becoming an administrator, you can reach him at huebner@umr.edu.

Dr. Douglas Mattox, Professor Emeritus

This is Prof. Mattox last semester of lecturing in the classroom. He would appreciate getting email feedback on interest in a three-credit, Ceramic Dept. web-based, introductory, business/economics course focusing on ceramics businesses - sort of a "pocket MBA". For the last eight years, Ceramic Engineering students have taken his department offering: Principles of [Economic] Design [for Manufacturing], which included similar material. Please help him assess your interest by contacting him at dmattox@umr.edu.

Dr. Robert E. Moore, Curators' Professor Emeritus

Jose M. Almanza, Ph. D. candidate, is using a beta"-alumina sensor to measure NaOH vapor in soda-lime glass tanks with a grant from CGR (Center for Glass Research). The method may also have applications in measuring NaOH in flue gases from coal fired gas turbine exhausts. The cell is an open design which uses oxygen or air as reference electrode. The sensor has been compared to other techniques, including LIFF (laser-induced fragmentation fluorescence), showing rapid response and stability during periods of up to 10h at 1400oC.

A Digital Library of Ceramic Microstructures: The National Science Foundation is sponsoring a program to create a digital library of microstructures for functional ceramics emphasizing materials used for structural, electronic, and thermal applications. Dr. Roger Wills (Univ. of Dayton, Ohio) is the Principal Investigator for the project while Dr. Matthew Ferber (ORNL) is responsible for the section on virtual experiments. Drs. Tennery (ORNL), Velez and Karakus (UMR), Sankar (North Carolina State Univ.), and Thadhani (Georgia Tech) are supplying digital images of ceramic microstructures together with associated information about the properties of the different ceramic materials. Students from each university will beta test the website by September 2003.

Dr. William Headrick, Asst Research Professor of Ceramic Engineering, has been awarded the first of three annual $200,000 grants by the Department of Energy to develop cost effective materials for the containment of black liquor during combustion of the volatiles produced in the pulping of paper. Dr. Headrick has designed and built a sophisticated test facility for evaluating the containment materials. New gasifier equipment has to be designed to operate at high pressures at temperature and will require more advanced materials The project is being funded by the National Energy Technology Lab of the U. S. Department of Energy.

Dr. Headrick recently completed a study, "Characterization and Structural Modeling of Magnesia-Alumina Spinel Glass Tank Refractories," for the Department of Energy working with scientists at Oak Ridge National Laboratory. A partner on this study, Dr. James Hemrick, who obtained his Ph.D. from UMR is collaborating with the members of the Refractories Satellite at UMR, affiliated with the Center for Glass Research at Alfred University. This center is coordinated by the National Science Foundation through its I/IURC (Industry University Research Centers) Program. The Refractories Satellite Group at UMR has been active with glass companies and other partners in precompetitive research projects for almost a decade. These projects have focused on the materials and sensoring requirements of glass melters using new oxyfuel combustion technology.

Dr. Darrell Ownby, Professor Emeritus

2002 was the most productive year yet for our family. Four new grandsons were born, Samuel Edward Thomas on February 9, Benjamin Evan Ownby on May 24, Ethan David Murray on November 2, and James Crumpler Thornton on December 15. The year 2003 may be another Ownby record since we are already expecting triplets in May!!

Not teaching in the Fall Semester for the first time in 34 years has given us more time to travel and be with the grandchildren. Dr. Hilmas now refers to me as the 'Visiting Professor'. I like this new title and will try to live up to it!

My last two graduate students will now be receiving their degrees and going out into 'the real world'. **Francisco DeLaCruz** received his M.S. in December and **Ben Eldred** successfully completed his dissertation defense and should receive his Ph.D. in May. He has accepted a job as a Research Engineer in the Slide Gate Group with Vesuvius in Pittsburg, PA.

The 14th International Boron Symposium in St. Petersburg, Russia was enjoyable for Nina and me since we renewed international friendships going back 30 years.

My diamond polytype research has taken an interesting turn now collaborating with Emeritus Professor **William (Bill) James** and Dr. **William (Bill) Yelon** using neutron diffraction, (ND), we have been able to not only confirm the x-ray diffraction and IR results but give a more accurate quantitative measure of the polytype distribution. We are also planning to determine the crystal structure of BF3 NO2CH3 by ND.

I have continued to serve on the National Research Council's Evaluation Panel for Associateship Programs in Washington, D.C. and since three of our children and two of our new grandsons (and the expected triplets) reside in Southern Virginia that has become our second home during the Christmas holidays.

Dr. Mohamed (Len) Rahaman, Professor

Professor Rahaman has been involved in the establishment of the department's new Bio-materials M.S. option, is finishing the second edition to his book, *Ceramic Processing and Sintering*, and has started new research collobration with the U.S. Air Force.

Dr. Robert W. Schwartz, Professor

Dr. Robert Schwartz joined the department in May 2002 and works in the area of electronic ceramics. This has been a busy, but fun year which involved my relocation from Clemson University to UMR, as well as a trip to Nara, Japan to give a talk at IFFF 2002, a meeting on ferroelectric ceramics with more than 600 participants from around the world.

Current research activities include the low temperature fabrication of ferroelectric PZT films on a variety of thin substrates (NASA-Langley), the development of transparent conducting oxides for applications associated with the protection of military infrared sensors (DARPA), and investigations into the voltage tunability of the dielectric constant of perovskite materials (NSF Center for Dielectric Studies). The group also has ongoing research in piezoelectric ceramics. The graduate students in the group include **Nan Navapan** (Ph.D.; intrinsic and extrinsic effects in stress-biased actuators), **Ryan Thayer** (Ph.D.; finite element modeling of non-linearities in piezoelectric devices), **Manoj Narayanan** (Ph.D.; multiaxial loading effects in piezoelectrics), and **Chunhong Zhou** (M.S.; antiferroelectric PLZT ceramics for energy storage capacitors). Undergraduate students in the group include **Ben McCarthy** and **Josh Mattingly** (fabrication of ferroelectric and transparent conducting oxide thin films).

Bob looks forward to the continued establishment of his research group at UMR and to many fruitful collaborations with other UMR faculty members. One goal that we hope to achieve in the next year or so is an NSF-funded program for an integrated graduate research and education program in piezoelectric materials. The program will result in the professional training of students in the materials, mechanics, and electrical circuit aspects of piezoelectrics. **Dr. Stutts** in Mechanical Engineering, **Dr. Pekarek** in Electrical Engineering and **Dr. Chen** in Civil Engineering will be the other principal faculty participants. (rwschwar@umr.edu)

The Heritage Society

Throughout its history, MSM-UMR has benefited from the generosity of alumni and friends who have provided support through their bequests and other planned gifts. The Heritage Society is our way to recognize those who have invested in the university's future through planned gifts. These gifts include a variety of testamentary and lifetime arrangements that provide future support for the university and financial benefits for the donor.

Take advantage of Planned Giving through the Heritage Society. To request information on the benefits of membership or to learn more about ways to remember UMR through a planned gift, call the Office of Planned Giving at 800/392-4112 or email judyc@umr.edu.

Dr. Jeffrey D. Smith, Associate Professor

My research group includes a host of graduate and undergraduate students as well as a research specialist. Currently I advise or co-advise three Ph.D and three M.S. students although five multidisciplinary research programs with the Metallurgy Department (with Drs. **Kent D. Peaslee**, **David C. Van Aken** and **F. Scott Miller** as co-investigators), cause that number to fluctuate considerably. Most of the research involves high temperature materials used in heavy industry manufacturing of steel, titanium and aluminum. Other efforts, not directly related to refractories, include plasma spray coating of oxides onto oxides and metals and characterization of oxide and non-oxide materials. Nearly all of these research efforts receive partial funding from the Department of Energy, through the Office of Industrial Technologies. Bill Fahrenholtz and I have a new program looking at materials for low pressure casting of aluminum. The effort involves Oak Ridge National Laboratory and is funded by DOE and Pyrotek, Inc.

In the fall, I taught 'Phase Equilibria' (CER 251), contributed lectures to one of the introductory ceramics courses (CER 104) and teamed with Greg Hilmas and Bill Fahrenholtz to teach 'Senior Design' (CER261). Courses taught in the spring include 'Refractories' (CER364) and the second half of 'Senior Design' (CER262).

Alumni Correspondence

Jared Jones, '02, "Just wanted to drop you all a message, see how things are going, and tell you the latest news from New Madrid County. I got that job teaching at East Prairie High School teaching math. I don't know how you all felt your first day, but I think I want to hurl. The number of kids in my classes aren't too bad so I should have as easy a time as you can have trying to control teens. I'll start working on my Master's in Administration next semester on-line and through the summer. Don't know about getting a job in it yet. I've been teaching a Bible study at the Juvenile center here and am Assistant Pastor at the church I'm going to. Have plans of building a small home soon but not decided on which piece of property. Hope you all have a good year at Rolla and hope to have time to stop back through from time to time."

Sean Teitelbaum, '97, "I have been busy, no I haven't been offered a command yet but I have interviewed. On December 5, 2002 at 8:42 pm Stacy and I welcomed Abigail Maxine Teitelbaum into the world. She was 7 lbs, 11 oz. and 21 inches long. She has been one very well-mannered but quiet baby so far."

Geoff Brennecka (M.S.) – Stress-Induced Orientation in Chemical Solution Deposited Tetragonal Lead Zirconate Titanate Thin Films (Huebner)

Carol Click (Ph.D.) – Platinum in Phosphate Laser Glasses (Brow)

Robert Leerssen (M.S.) – Iron Phosphate Glass for the Vitrification of INEEL Sodium Bearing Waste and Hanford Low Activity Waste (Day)

Jessica Lowry (M.S.) – Dissolution Behavior of Alkali Borate Glasses (Brow)

Michael Matthews (M.S.) – Development of a Repeatedly Adjustable Intraocular Lens Incorporating Samarium Cobalt Rare Earth Magnets (Hilmas)

Heather Teitelbaum (M.S.) – Borate Glasses for Bioactive Coatings on Titanium (Brow

Andrew Wittenauer (M.S.) – Preparation, Properties and Structure of Rare-Earth Phosphate Glasses (Brow)

December 2002 Graduates
Front row (l-r): Amanda Young, Natalie Vanderspiegel, Brian Johnson, and Laura Schoenbeck. Back row (l-r): Ellis Smith (Professional Degree recipient), Jacob Gross, Brett Scarfino, Sam Schoenberg, Morgan Smith, Eric Salgat, and Cynthia Finley.

May 2002 Graduates
Front row (l-r): Courtney Peace and Holly Bentley; sideways (middle) Elizabeth Sandefur; back row (l-r): Angela Puccini, Jeremy Watts, Doug Legel, Andy Vidal, Sean Landwehr, Adam Chamberlain and Tom Ruebusch.

1952 Alumni Visit to UMR
We enjoyed hosting seven 'Golden Alumni' during the university's alumni weekend in June 2002. Delbert and Shirley Day hosted the magnificent seven at their home, where this picture was taken. Seated in the front row are (l-r): Emil Hrbacek, George MacZura, Sam Schneider, and Del Day; back row (l-r): Bill Guinn, Everett Stevens, John Bartel, Pete Lucindo and Richard Brow.

Phonathon Donors for 2002

Addington, Larry A, 1970
Allmon, Gerald W, 1958
Altenbaumer, August Fredrich, 1999
Anderson, Harlan *,
Armstrong, Charles R*, 1974
Autry, Tracy Andrew, 1989
Babyak, Brent Markham, 1984
Baker, Paul A, 1977
Banks, John P, 1964
Bartel, John G*, 1952
Baumbach, Elizabeth A, 1990
Beck, Daniel Joseph*, 1986
Birkenmeier, Jeffery Dean*, 1993
Biundo, Vito , 1990
Blank, James S*, 1950
Brennecka, Geoffrey Lee, 2001
Brow, Richard K*,
Browne, Thomas C, 1951
Brunner, Julie Lynn*, 1988
Burdick, Vernon L*, 1967
Burks, Gary M, 1971
Busch, Kelly Jae*, 1982
Byars, Zach Rickman, 1995
Cauthorn, James E, 1953
Chen, Chieh-Cheng , 1988
Click, Carol Ann, 2000
Conrad, John Andrew, 1991
Conzone, Samuel D*, 1996
Copp, Albert N, 1962
Coppinger, Timothy Andrew, 1989
Daniels, William H*, 1964
Day, Delbert E*, 1958
Denlow, Israel *, 1970
Dice, Fred R, 1959
Dillingham, John Ross, 1993
Drag, Clemens P, 1968
Drumwright, Richard C, 1968
Duderstadt, Edward C, 1958
Dutton, Roland E, 1976
Engle, Benita Carita, 1998
Erickson, Kelvin T, 1978
Fahrenholtz, Jill C.*,
Fields, Howard L*, 1962
Flandermeyer, Brian K, 1976
Fredholm, Mikael Robert, 1988
Gac, Frank D*, 1975
Gonzalez-Tait, Victor Edmundo*, 1999
Graves, Michael C, 1971
Green, Maurice E, 1964
Griffin, William R, 1951
Grimm, Mary Elizabeth, 1996
Gruver, Robert M, 1956
Haertling, Gene H*, 1954
Haling, Scott Arthur, 1993
Hall, Matthew Micah, 1998
Hann, James Russell, 1990
Hanser, Andrew David, 1992
Hart, Robert L*, 1970
Headington, Dennis H, 1962
Headrick, William Lloyd*, 1991
Hellriegel, Edgar J, 1950
Hemrick, James Gordon*, 1997
Hill, James L*, 1964
Hillstrom, Katie Ann, 1999
Huang, Dong Dong, 1994
Huebner, Wayne *, 1982
Humphrey, Kurt D, 1978
Hunter, Orville *, 1960
Johns, Timothy Philip*, 1998
Johnsen, Laura Elizabeth*, 1998
Johnson, Wayne E, 1968
Jones, Raymond B, 1946
Jungquist, Gordon E, 1971
Karp, Robert D, 1979
Kasten, Kenneth G, 1950
Kasten, Vernon L*, 1945
Keltner, Steven Jack*, 1996
Kiburz, Walter H, 1946
Koc, Rasit , 1986
Koenigstein, Karen Sue, 1993
Koenigstein, Michael Louis, 1993
Kottman, Robert , 1981
Krueger, Daniel Scott, 1994
Krull, Lawrence David, 1988
Kummer, Donald L*, 1955
Lampe, Michael L, 1975
Larsen, Glen A, 1970
Larson, Rodney Wallace*, 1985
Latimer, Valerie D*, 1985
Lawrence, James Gregory*, 1981
Leach, Billie E*, 1970
Leach, Christopher Travis, 1992
Lewis, John W, 1947
Lohman, Brian F, 1997
Louder, Mark Lynn, 1990
MacZura, George *, 1952
Mason, Walter E, 1982
McCauley, Ronald A, 1964
McCullah, Willie E*, 1968
McGregor, Marisa Loree, 1999
McIntyre, Daniel Steven, 1991
McKinnis, Mrs. Charles (Margaret) *, 1947
McPherson, Philip D*, 1983
Mitchell, John F, 1959
Modde, Michael F, 1963
Moore, David W, 1967
Mueller, Edward E*, 1948
Neidt, Tod Michael*, 1988
Osborne, Brian K*, 1990
Ownby, P Darrell, 1962
Pautler, Patrick J, 1982
Pericich, Paul Michael*, 1986
Peters, Jason Edward, 1996
Phillips, Jeffrey A*, 1984
Pokross, Charles , 1970
Portnoff, Neil S, 1970
Posda, Jennifer *, 1976
Proctor, Darren Leon, 1999
Ramey, Roy R, 1970
Reynolds, E Richard, 1974
Rezek, Erika Maya, 1999
Robertson, John M, 1952
Robinson, Joshua Howland*, 1991
Roloff, Don V, 1951
Rutz, Heidi Leigh*, 1985
Sabec, Joshua Mark*, 1997
Sabo, Angela Jeanne, 1987
Schlett, Paul E, 1972
Schneider, Robert Arnold, 1992
Schoby, Keith Eugene*, 1992
Shawgo, Ryan James*, 1998
Shelby, James E*, 1965
Simpson, Cynthia A*, 1988
Skoog, Andrew Jay*, 1986
Skouby, Erica Marlene*, 1984
Smith, Harlan D*, 1948
Smith, Jason Andrew*, 1998
Smith, Jeffrey Douglas*, 1991
Smith, R Thomas*, 1958
Smith, Russell D*, 1972
Snajdr, Edward A*, 1961
Steinkamp, William E*, 1964
Stevens, Everett George, 1952
Suiter, David J*, 1974
Taylor, George H*, 1964
Teitelbaum, Heather Kimberly, 2000
Tetley, Albert L*, 1939
Tira, James S, 1963
Tucker, Carl David, 1989
Tyler, James D, 1970
Vance, M W, 1965
Vandenbergh, Maurice E, 1974
Vehige, Sarah E, 1999
Venable, Ramona Lynn, 1983
Wagner, Jennifer Lynn, 1999
Werner, Roy C, 1943
Wesling, John Gregory*, 1988
Wetteroth, Thomas A*, 1979
Wilke, Sara Ellen, 1981
Wilkins, Eric George*, 1990
Willer, Matthew W*, 1998
Williams, Scott Michael*, 1997
Wojcik, Joshua Adam*, 1997
Young, Gregory Alan, 1981
Young, John C, 1953
Zullig, Dennis L*, 1970

*Denotes gift of over $100

This list was provided to us by the University Office of Advancement. We believe it is complete, but if we missed someone--please, our sincere apologies!

What's New With You?

Job change? New address? New kids? Grandkids? Great vacation? Got married? Let us know. We're always glad to hear from you! We'll pass on to the Alumni Office for publication in the MSM Alumnus. We would also appreciate any comments about our newsletters, (what you would like to see, how often, etc.). (You can also submit changes online via our webpage at http://www.umr.edu/~ceramics/Employdata.html).

Name _____ Class Year _____

Address_____ Home Phone_____

City _____ State _____ Zip _____

Job Title _____ Employer _____

Work Address_____

Work Phone _____ Email _____
Comments:

Alumni Dinner Registration Form

Deadline: April 21, 2003

The dinner will be held on Monday, April 28, 2003 at the Big River Grille (111 Broadway) located downtown Nashville on the river (this is about a 20 minute drive from the resort where the ACerS annual meeting will be held). The cost is $25.00 per person and you will have the choice of prime rib, brown ale chicken, salmon, or penne al fresco, a dinner salad, dessert, and coffee, tea, or soda. (You can make your choice on dinner when you arrive.)

Please make all checks payable to "UMR" and send to:

University of Missouri-Rolla
Ceramic Engineering Department
Attn: Denise Eddings
222 McNutt Hall
Rolla, MO 65409-0330

Name: _____

Address: _____

Phone: _____ Email: _____

University of Missouri-Rolla
Ceramic Engineering Department
222 McNutt Hall
1870 Miner's Circle
Rolla, MO 65409-0330