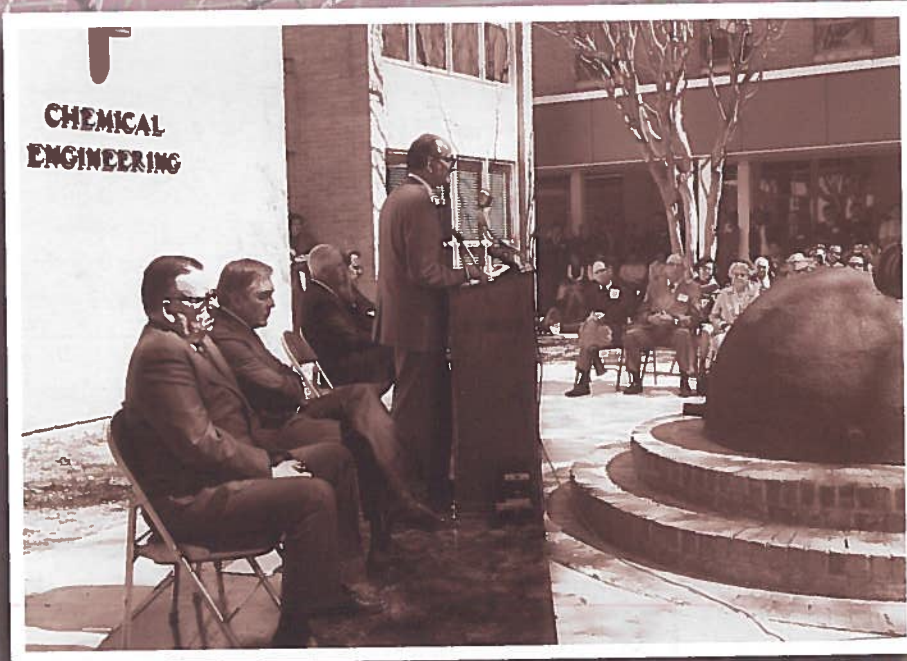


Chemical Engineering

VOLUME 13

SPRING 2000



GORDON A. AND MARY CAIN
DEPARTMENT OF CHEMICAL ENGINEERING

Alumni Newsletter

LOUISIANA STATE UNIVERSITY

Letter from the Chairman

Dear Alumni and Friends,



The spring semester has shown good progress, with discussions of a new chemical engineering building under way. The Industrial Advisory Committee is working to make the Louisiana State Legislature aware of our need for a new building and how the success of the Gordon A. and Mary Cain Department of Chemical Engineering can impact the success of the state economy.

Quite frankly, we are at a crossroads. We will remain a good department, regardless of the decision on a new facility. However, if the department is to take the next step up in national recognition, a new building or significant modernization of our existing facility is a must. Our current facility consists of a 1938 and 1970 building, both of which are showing age and are small by today's standards. Hiring Cain chaired professors into existing facilities will be a challenge.

Two of our faculty members are leaving us: Geoffrey L. Price and Maciej Radosz. Professor Price, who has been at LSU for 22 years, is taking the position of chemical engineering department chair at the University of Tulsa. Professor Radosz, who has been at LSU since 1995, will be taking the position of chemical engineering department chair at the University of Wyoming. We wish our colleagues well in their new endeavors.

Modernization continues in our undergraduate laboratory. Personnel from ExxonMobil Chemical helped Kerry Dooley in configuring the new TDC3000 system, donated by Honeywell. Installation of the system included upgrades of the software, work stations, and other components. Fischer-Rosemount has also awarded us a \$200,000 grant to develop a computer-controlled batch polymerization facility using their Delta-V control system. In addition, our department received \$58,000 from the LSU Student Technology Fee to help develop the batch polymerization facility.

*This newsletter highlights just a few of the accomplishments of our two departing faculty members, Professors Price and Radosz. Also, the current research efforts of Lisa Podlaha are detailed. Her work focuses on the electrodeposition of alloys and nanocomposites, with practical applications in the field of microdevices. We are also including an article that appeared in *The Advocate*, describing some of Frank Groves' accomplishments in his 40-plus years at LSU.*

As always, if you have any questions or comments regarding our program and the direction in which we're headed, please do not hesitate to come by the department. The faculty and I would be most interested in speaking with you.

Sincerely,

A handwritten signature in black ink that reads "F. Carl Knopf". The signature is written in a cursive style with a large, stylized "K" at the end.

*F. Carl Knopf
Robert D. and Adele Anding Professor and
Department of Chemical Engineering Chairman*

If you would like to know more about contributing to the department, please contact Carl Knopf at 225/388-1426 or send an e-mail to hroussaud@che.lsu.edu

A WORD OF THANKS TO OUR SPRING 2000 CONTRIBUTORS

Although financial support has been impressive, departmental expenses continue to escalate and further renovations are essential in remaining parallel to our competitive counterparts. We would like to thank the following corporations and individuals for their role in maintaining the outstanding reputation that LSU has achieved throughout the years.

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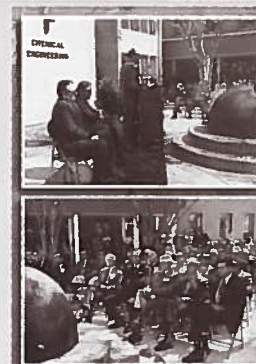
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On Our Cover



Dedication ceremonies of the chemical engineering facility in 1970. Dignitaries attending the event included (first picture, sitting front to back) LSU President John Hunter, Governor John J. McKeithen, Dean of Engineering Roger Richardson, LSU Vice President Joe Reynolds, (speaking) Chemical Engineering Chairman Joe Polack, (just left of sugar kettle) Jesse Coates, (second picture, first and second to right of sugar kettle) Chancellor Cecil "Pete" Taylor and Provost Paul Murrill.

CHEMICAL ENGINEERING is published for the benefit of the department's alumni and students. Comments and suggestions should be directed to:

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Bidding Farewell to Two Professors

TWO PROFESSORS are leaving LSU's Department of Chemical Engineering this summer. Both Geoffrey Price and Maciej Radosz have accepted department chair positions at other universities. Price and Radosz have been invaluable in their teaching and research while at this University.

GEOFFREY PRICE



▲ GEOFFREY PRICE, HIS WIFE, JUDY, AND SONS JERRY AND JOEY ENJOY A SWAMP TOUR.

GEOFFREY PRICE is retiring from LSU with 20 years of service. He will be taking the position of department chair of chemical engineering at the University of Tulsa. Price came to LSU straight out of graduate school, earning his Bachelor of Science degree from Lamar University in 1975 and his Ph.D. from Rice University in 1979. Price's concentration is in heterogeneous catalysis and zeolites, and he is a member of the American Institute of Chemical Engineers (AIChE), American Chemical Society, Southwest Catalysis Society, among many other chemical engineering organizations.

After becoming a full professor in 1992, Price was awarded the Robert Hughes Harvey Endowed Professorship in 1998. Of his time at LSU, he said, "I learned everything I know about being a faculty member," including teaching and grant-writing methods, dealing with students, and establishing research projects.

The research and grant-writing skills will definitely benefit Price at Tulsa. He said one of his assignments as chairman will be to help build up the research aspect of the department, including cultivating an already existing support base. "If it weren't for my experience at LSU, I wouldn't be anywhere close to being qualified," he said of his new position.

When asked about memorable moments during his time at LSU, Price said there are too many to choose from. But he did learn to appreciate the different definitions of a "good" cup of coffee.

One Monday morning early in his career at LSU, he poured himself a cup of coffee in the lab and thought it tasted horrible and was probably made over the weekend, so he tossed the whole pot. A graduate student entered moments later and asked why Price threw away the coffee he had just made. It turned out the coffee was chicory, which Price hadn't experienced until then.

About a month later, Price poured himself a cup of coffee and found that it tasted funny. But he assumed it was chicory again. He still recalls with amusement how he felt when the same graduate student came into the lab and asked him if he had made coffee, since the current pot held coffee made the previous Friday.

Price also remembered a well-known faculty member, Clayton Callihan, whom he described as "a continuous ball of laughs." Price said that when older alumni discovered he taught at LSU, Callihan was one of the first faculty members they asked about. Price said he and Callihan were great friends, although their research topics and teaching styles were completely different.

Just as important to Price as academia is giving back to the community. When asked what he will miss the most about leaving LSU and Baton Rouge, he quickly replied, "Our church." He is active in the community, serving as president of Recycled Computers for Kids, Inc., a local nonprofit service organization. This service, in fact, earned him recognition by a local television station. He is also on the local High School for Engineering Professions Advisory Committee.

Price also said that he will, of course, miss Louisiana food, especially crawfish boils. And what about LSU itself? Price said there are so many things about LSU he'll miss, but suspects that his sons will miss LSU baseball the most.



▲ GEOFFREY PRICE WITH CLAYTON CALLIHAN AND THE LATE MRS. FRANK (MARGARET) GROVES IN 1979.

MACIEJ RADOSZ



MACIEJ RADOSZ has brought an impressive body of knowledge to LSU's chemical engineering program. Radosz holds two U.S. patents, "Supercritical Mixed-Solvent Separation of Polymer Mixtures" and "Low-Emission Ester-Based Stocks for Low-Emission Lubricants," and is the editor of an international journal on fluid phase equilibria. He will join the University of Wyoming as department chair.

Radosz received his Master of Science degree in 1972 and Ph.D. in 1977 from the Cracow University of Technology in Poland. He came to the U.S. in 1980 as a research associate at Purdue University, and a year later he joined the Exxon Research and Engineering Company in New Jersey. In 1992, while still with Exxon, he became an adjunct professor of chemical and biochemical engineering at

Rutgers University. Radosz joined the LSU chemical engineering department in 1995 as professor and M. F. Gautreaux-Ethyl Corporation Chair. He is also a member of AIChE and the American Chemical Society.

During his time at LSU, Radosz was instrumental in establishing a macromolecular-materials program, a strong component of the University's macromolecular and materials networks. He has also helped bring in more than three million dollars in research support, including industry grants as well as grants from the National Science Foundation and the Department of Energy.

But just as important, Radosz said, he "persuaded a fraction of about 400 chemical engineering undergraduate students and about 100 graduate students that thermodynamics is an exciting and useful subject."

Radosz said he hopes to make a difference at the University of Wyoming by helping others succeed. He feels that his blend of industrial and academic background has been beneficial in preparing him for his next career as a department head.

Radosz's industrial experience is invaluable to students, as he has first-hand knowledge of what it takes to succeed in the industry. He said that his relationship with students has been one of the most memorable things about teaching at LSU. He values the comments and questions students share with him. He called it a "learning experience by teaching."

When asked what he will miss most about Louisiana and LSU, Radosz replied, "If someone were to ask me 20-30 years from now . . . the daily contact with our friends and LSU students, but also the foliage and flowering plants all year around—that's the most memorable thing."

Certainly Radosz will miss the friends that he has made in the five years at LSU, along with the food and the music. But coming from northern Europe, he said, the abundance of greenery and flowers has been a constant source of enjoyment for him.

SPRING 2000 DEPARTMENTAL DISTINGUISHED SEMINAR SERIES

F. G. SHINSKEY

"Optimizing Load Regulation"
February 11, 2000

Shinskey, a process control consultant with Foxboro in New Hampshire, discussed the disparities in load regulator design, focusing on the importance of identifying load variables and their sources. Shinskey concludes that PID tuning rules can be amended to accommodate load dynamics, and his findings have been successfully applied to regulate steam superheat temperature. Armando Corripio served as host for this event.

ROBERT W. PETERS

"Development of the Integrated In-well Sonication/In-well Vapor Stripping Technology to Treat Chlorinated Solvent-contaminated Groundwater"
February 25, 2000

A research leader in soil and groundwater remediation at the Argonne National Laboratory in Illinois, Peters talked about the use of advanced oxidation technologies, using sonication coupled with vapor stripping to remove chlorinated organic compounds from groundwater. Argonne is currently studying this method for application in

remediation of groundwater contaminated with polyaromatic hydrocarbons. Peters' lecture was hosted by Kalliat Valsaraj.

isms that may become future drugs for fighting human diseases. Martin Hjortø was the host for Rorrer's lecture.

GREGORY L. RORRER

"Bioreactor Cultivation of Cells and Tissues Derived from Marine Seaweeds"
April 7, 2000

Rorrer, an associate professor of chemical engineering at Oregon State University, lectured on new biotechnology for establishing cell and tissue cultures from marine seaweeds. The focus of this project is the compounds found in marine organ-

Alloys and Nanocomposites— The Future of Microdevices



ELIZABETH PODLAHA

The future is here at LSU's Gordon A. and Mary Cain Department of Chemical Engineering. Science-fiction tales of microminiature devices being used on an everyday basis are close to becoming a reality, thanks to the work of Assistant Professor Elizabeth Podlaha. Podlaha currently holds the Clarence M. Eidt, Jr., Professional Development Professorship.

After receiving her Ph.D. from Columbia University in 1992, Podlaha performed post-doctorate work as a research collaborator at the Ecole Polytechnique Fédérale de Lausanne in Switzerland before coming to LSU. Her work with alloys and microfabrication have earned her lead principle investigator status on several prestigious collaborative projects, including "Chemical Analysis for the Development of Microfabricated Structures," awarded more than \$47,000 from the state of Louisiana Board of Regents' Enhancement program, and "Acquisition of Instrumentation for Microsystems Research and Development," awarded nearly \$240,000 from the National Science Foundation (NSF)/MRI program. Shown in the photo below is the X-ray fluorescence system that was acquired from these grants.



REGINA BERGERON WORKS ON THE X-RAY FLUORESCENCE SYSTEM, PURCHASED WITH GRANTS FROM THE BOARD OF REGENTS AND THE NATIONAL SCIENCE FOUNDATION.

A recent grant in the amount of \$109,000 was awarded for "Electrodeposition of Ternary Alloys for Microfabrication" from the state of Louisiana Board of Regents' Research and Development program. She is also a recipient of the esteemed NSF Career award. Podlaha currently advises eight graduate and two undergraduate students.

Podlaha's research is currently focusing on three major areas: nanocomposites, alloy coatings, and microdevices, all converging in electrodeposition technology.

ELECTRODEPOSITION OF NICKEL ALLOYS FOR MICRODEVICES

Electrodeposited nickel alloys are being investigated as improved materials for micro-electro-mechanical systems (MEMS). This project is a collaboration between Podlaha and professors from LSU's

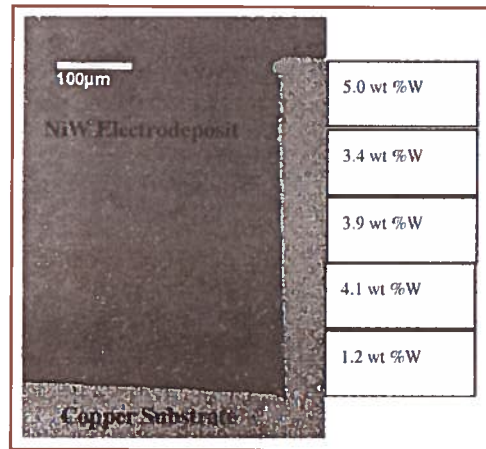


FIGURE 1. NIW ELECTRODEPOSIT 500 MICRONS TALL; 200 MICRONS DIAMETER

mechanical engineering department. Two model alloy systems were considered: nickel-copper and nickel-tungsten. The nickel-copper system represents a codeposition mechanism that is usually characterized by independent, metal reduction reaction rates. In contrast, the nickel-tungsten system is an example of the induced codeposition mechanism; nickel's reaction rate enhances the codeposition of tungsten.

The challenges that have been encountered are those related to gas-evolving side reactions (H₂) and diffusional limitations. Gas bubbles that cling to the deposit surface result in nonuniform deposit growth, and moderate pH rises can influence the deposition mechanisms, resulting in compositional changes.

One way to circumvent problems associated with gas-evolving side reactions is to optimize the plating conditions, avoiding, if possible, conditions where these reactions occur.

Podlaha's research takes a different approach. Pulse current and pulse potential schemes have been considered to manage the gas evolution reactions, instead of trying to eliminate them, which aims to generalize conditions for different alloy systems. Pulses longer than conventional pulse plating are used. According to Podlaha, this is "due to the longer diffusion relaxation times associated with deep recesses," in this case, recesses 500 microns deep.

Figure 1 shows a nickel-tungsten electrodeposit that was fabricated from a pattern of deep recess prepared with the service of the Center for Advanced Microstructures and Devices (CAMD) at LSU. A polymer, PMMA, is bonded to a copper substrate and cylindrical recesses were made through the PMMA with synchrotron x-ray lithography. The change of the tungsten concentration reflects the change of pH at the electrode surface.

ELECTRODEPOSITION OF NANOCOMPOSITES

Podlaha has been instrumental in developing pulse-reverse plating, shown to be a promising avenue for controlling and increasing

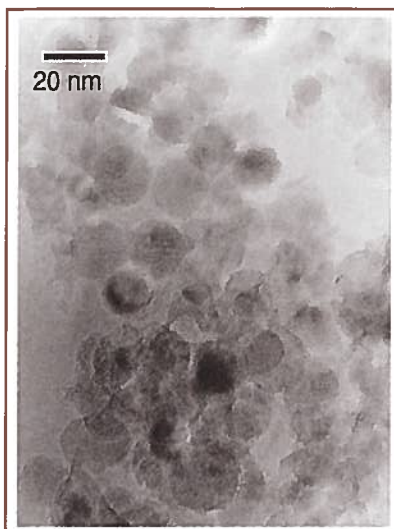


FIGURE 2A. CROSS SECTION OF NANOMETRIC PARTICLES.

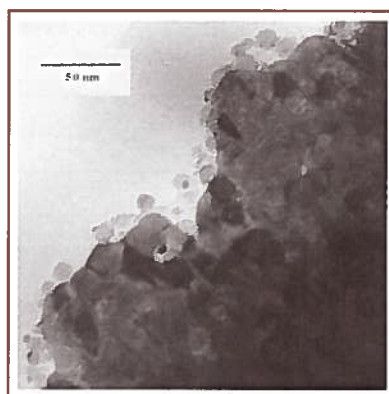


FIGURE 2B. TEM MICROGRAPH OF A THIN SLICE NEAR THE SURFACE OF A PULSE-REVERSE PLATED CU-γ-ALUMINA COMPOSITE.

the amount of particle incorporation in metal matrix composites. She describes the process as “selectively incorporating nanoparticles to make nanocomposites.”

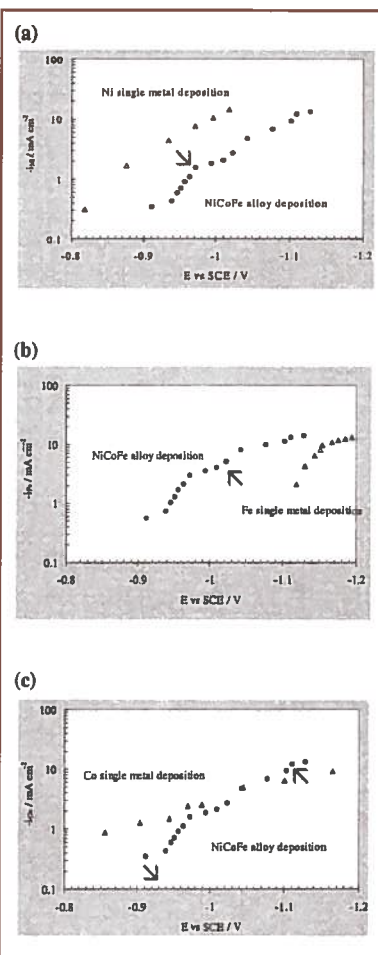
Podlaha received a \$200,000 award from the National Science Foundation to support work on nanocomposites over the next four years. In this process, particles are first embedded into the growing metal during the reduction cycle. Part of the metal is subsequently dissolved under an applied anodic current. Thereafter, the plating and dissolution are continued, resulting in an enrichment of the particle concentration in the composite. By controlling the net thickness per cycle in the nanometer range only nanometric particles are retained in the deposit, even when larger particle sizes are present in the electrolyte (Figure 2a). Successive layering thus results in a nanocomposite.

This pulse-reverse plating technique has to date been used to fabricate thin films of copper-alumina nanocomposites as shown in Figure 2b. Podlaha presented her findings at this year’s meeting of the Electrochemical Society.

ELECTRODEPOSITION OF TERNARY ALLOYS

Ternary electrodeposited nickel-cobalt-iron alloys have received recent attention because of their unique magnetic properties in cobalt-rich alloys and thermophysical properties in iron-rich alloys. They are also of interest as materials for MEMS.

FIGURE 3A. PARTIAL CURRENT DENSITIES OF (A) NICKEL, (B) IRON AND (C) COBALT. THE ARROW SHOWS THE CHANGE IN THE PARTIAL CURRENT DENSITY DURING ALLOY DEPOSITION FROM THE ELEMENTAL PARTIAL CURRENT DENSITIES.



Podlaha, with others, has been investigating the electrodeposition mechanism in the Electrochemical Engineering Laboratory. Shown in Figure 3a are the reaction rates of each metal reduction. As expected, the nickel deposition rate was inhibited. Concurrently, the iron rate was accelerated and the cobalt rate exhibited both inhibition and acceleration, which has never been reported before for this ternary system. Podlaha and Yun Zhuang, the graduate student working on this project, have recently submitted their results to the *Journal of Electrochemical Society*.

“We are exploring this new phenomena experimentally with a view toward developing a mathematical model for process control applications,” Podlaha said.

Another ternary electrodeposition system that is being studied is nickel-tungsten-iron based. Podlaha and her research group theorize that tungsten codeposition occurs through a mixed-metal intermediate requiring the inducing elements. If the tungstate ion

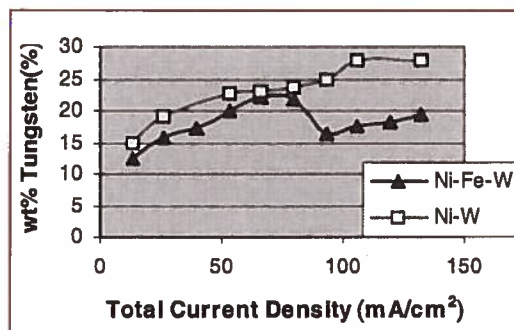
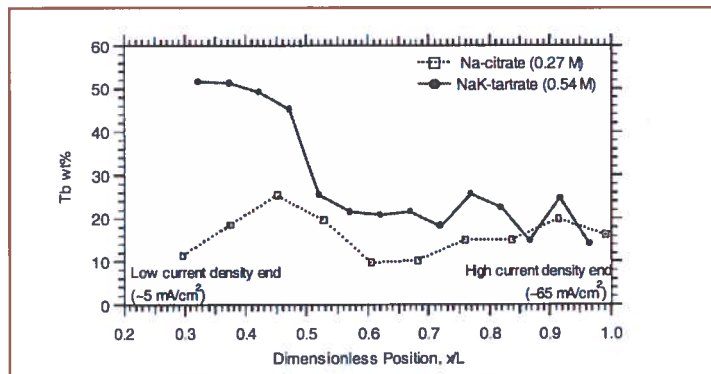


FIGURE 3B. WEIGHT PERCENTAGES OF TUNGSTEN FOR NI-W DEPOSITS AND NI-Fe-W DEPOSITS VS. TOTAL CURRENT DENSITY PLATED ON A ROTATING CYLINDER ELECTRODE, pH=8, ROTATION RATE=800 RPM.

concentration is kept smaller than both nickel or iron ion concentration, then the deposition rate of tungsten should not be influenced by the codepositing metal. This is illustrated, for the first time, in Figure 3b.

Podlaha and Shirlene Chew, the undergraduate student working on the project, plan to present their findings at the next meeting of the Electrochemical Society.



▲ **FIGURE 4. Tb COMPOSITION ALONG AN ELECTRODE SURFACE WITH VARIABLE CURRENT DENSITIES.**

ELECTRODEPOSITION OF RARE-EARTH ALLOYS

According to Podlaha, bulk Terfenol, TbFe₂ (Tb: 58.7 wt%, Fe: 41.3 wt%), exhibit giant magnetostriction at room temperature; in other words, they deform under an applied magnetic field.

Instead of standard non-electrochemical deposition techniques, Podlaha and her colleagues fabricated these materials by electrodeposition from aqueous solutions. Her work with nickel-cobalt-iron alloys crossed over into this research.

“We have found that the presence of the iron ion facilitates electrodeposition of the terbium rare-earth,” she said.

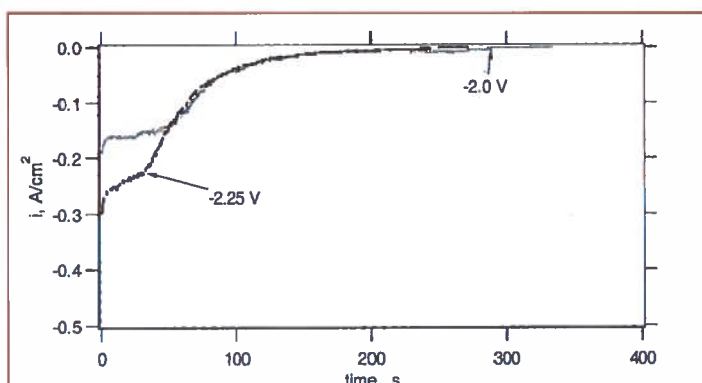
Figure 4 shows an example of the weight percent terbium measured in a terbium-iron alloy electrodeposited in a citrate and a tartrate electrolyte. The current was varied to determine the influence of the current density on alloy composition, and a high terbium concentration was found with the tartrate solution at low current densities.

ELECTRODEPOSITION OF OXIDE SORBENTS

This groundbreaking project recently received funding of nearly \$200,000 from the Department of Energy as part of the University Coal Research (UCR) Core Program. Podlaha collaborated with fellow Chemical Engineering professor Douglas Harrison to generate ceria-zirconia sorbents electrochemically to permit the desulfurization of coal gas.

These sorbents have been manufactured by other methods (for example, chemical precipitation) but have yet to be fabricated by electrodeposition. Other researchers have shown that the electro-generation of ceria and zirconia is possible by applying a cathodic current at an electrode surface from two separate electrolytes.

Podlaha and Harrison devised a method where both ceria and zirconia are deposited together from a single electrolyte in order to provide intimate mixing of the two oxides. Figure 5 shows how the current density decreases as the electrode surface is progressively covered with the oxide sorbent.



▲ **FIGURE 5. ELECTROGENERATION OF SORBENT IN A QUIESCENT AMMONIA NITRATE SOLUTION.**

STUDENT-CENTERED RESEARCH

ELIZABETH PODLAHA has engaged both undergraduate and graduate students in her projects. In the last couple of years, she has included the whole spectrum of undergraduate students as researchers in the laboratory. Last year, her student assistants were a senior, a junior, and a sophomore; the year before, she had a freshman as a student research assistant. She encourages “hands-on” training for all students.

The work of these assistants encompasses not only the “nuts-and-bolts” work in the projects

but taking part in the co-authoring and copresentations of papers. Some of the recent student copresentations include “Experimental Kinetic Study of FeCoNi Ternary Alloy Deposition” and “NiCoFe Ternary Alloy Deposition: I. An Experimental Kinetic Study” by Yun Zhuang and “The Study of Induced Codeposition of Ni-W Alloys” by Bruce Hubbard, presented at this year’s Electrochemical Society convention.

Presentations scheduled for next year’s Electrochemical Society’s convention include



“Development of Electrodeposited Tb Alloys” by Jingying Gong and “Induced Codeposition of Ni-Fe-W Alloys” by Shir-lene Chew and Bruce Hubbard.

▲ **ELIZABETH PODLAHA EXPLAINS ELECTROCHEMICAL TECHNIQUES TO GRADUATE STUDENT JINGYING GONG.**

INDUSTRIAL ADVISORY COMMITTEE NEWS

The Industrial Advisory Committee met on January 28 to discuss progress of the new chemical engineering building. Provost Daniel Fogel, Vice Chancellor Lynn Jelinski, and Bob Bauman, assistant to the vice chancellor of Academic Affairs, emphasized the impor-

tance of the chemical engineering facility to LSU's mission.

Committee members attending the meeting included: Committee Chair Al Lopez, Bill Rainey, and Lindsay McMorris from Exxon; Alden André and Kelly Serio from Formosa Plastics; Michael Barrett from Fischer-Rosemount

Systems; John Berg from Shell Chemical; Jim Boone from Albemarle; Steve Delo from Allied Signal; Vernon Fabre from BASF; Dwight Fontaine from Dow Chemical; Dave Magee from Georgia Gulf; and Dave Mongrue from Union Carbide.

The Advisory Committee has been a strong advocate of the

ongoing improvement in our undergraduate laboratory; and the committee is currently working on increasing awareness of the need for a new building with the state legislature. The Advisory Committee's next meeting will be in October.

HONEYWELL/EXXONMOBIL PROCESS CONTROL PROJECT IMPLEMENTED

The department took a major step forward in its laboratory facilities with the addition of a TDC3000 distributed control system to the undergraduate labs.

Honeywell Industrial Automation and Control donated the basic equipment, in the process upgrading the software, the workstations, history module, IO processors, and field termination assemblies. ExxonMobil Chemical assisted us in configuring the system, with several employees of the Baton Rouge complex donating their time and effort. Key players were Mary Mowrey, Erin Percell, Larry Bumgardner, and Advisory Committee members Jake Martin (now retired) and Lindsey McMorris for ExxonMobil, and Mark Firmin and Chuck Spicer of Honeywell. We thank these and all others who assisted us in realizing this project.



▲ EXXONMOBIL EMPLOYEE ERIN PERCELL (RIGHT) AND PROFESSOR FRANK GROVES (LEFT) CONFIGURE THE SOFTWARE IN THE NEW TDC3000 SYSTEM.

The system is currently being used to control—both in start-up/shutdown and at steady state—a packed distillation column, an experiment in the senior lab. The 3-inch diameter, two-story column and ancillary facilities were renovated and integrated into the senior lab in 1998; the original facilities were provided to the department by Exxon Chemical in 1987 as part of a joint project between Exxon Chemical and LSU. Your donations paid for the renovations.



▲ MONITOR DISPLAY OF TDC3000 SYSTEM CONTROL

The control facility will also be used in teaching process control. We will soon migrate one other senior lab experiment—a pH neutralization nonlinear control experiment—from an older control system to the Honeywell system. All of this effort is focused toward making our curriculum as up-to-date and our graduates as employable as possible.

In other news concerning the upgrade of the undergraduate laboratory, Kerry M. Dooley and F. Carl Knopf were awarded approximately \$200,000 from Fischer-Rosemount Systems, Inc., and the John H. Carter Co., and \$58,700 from the LSU Student Tech Fee Program to develop a completely computer-controlled batch processing/polymerization facility.

Back in the classroom

LSU ENGINEERING PROFESSOR CHOOSES TEACHING OVER RETIREMENT

By LAURIE SMITH ANDERSON

Advocate staff writer (as appeared in The Advocate, May 26, 2000)

WHEN Frank R. Groves, Jr., was five years old, an older cousin brought a chemistry set to his home and made green fire.

"I was hooked," laughed Groves, a 71-year-old adjunct professor at LSU's chemical engineering department who retired from his full-time job in 1994 but kept his office and soon returned to what he does best—research and teach.

"I feel lucky, not special" to still be working, he said. "I get bored with golf and fishing and I have a horror of sitting home watching soap operas. I'd just rather be here," he said, gesturing to the stacks of textbooks in his small office on the second floor of the chemical engineering department.

"He's amazing; he can teach any course in our curriculum," said department head Carl Knopf. "He's teaching senior lab now with one-on-one with students and, with his knowledge and experience, that's invaluable. He's quiet and assuming, but he's a true scholar." He also advises students and faculty on research projects and continues to do his own research for a modest stipend.

"I grew up in New Orleans during the Depression," Groves said. "I went to public schools there and was always interested in math and science. I liked to figure out how things worked. At Tulane [University], I probably would have gone on to study chemistry, but my father encouraged me to go into chemical engineering. He thought it would be more practical, and he was right."

After graduating in 1950, Groves took a job as a teaching assistant at Tulane, where he pursued his master's degree in chemistry. Then he went to the University of Wisconsin to earn his doctorate and worked in several jobs in industry for a while.

In 1958, he came to LSU as one of five professors in the chemical engineering department under Jesse Coates, with teaching as his primary responsibility.

"I love teaching. When you teach a subject, you have to really learn it yourself, and you also get new insights from your students."



FRANK R. GROVES, JR.
Advocate staff photo by Jill Snyder

One thing Groves said he does, as a teacher, is to take the more complex and abstract principles of chemical engineering and give everyday life examples as analogies.

In fact, he did that in the interview for this story. In explaining his own work in devising automatic control systems for chemical engineering processes, he used the human body as an analogy.

"If you are lying down and rise quickly, your blood pressure will drop. In order to keep you from passing out, your body will automatically increase its heart rate to compensate. In the same way, automatic control systems use sensors to adjust for variables and keep operations, such as flow and pressure, constant."

Groves' research later moved into thermodynamics. As the department grew and he was promoted to full professor, he was able to spend more time on research.

Chemical engineering has changed over the years, he said, pointing to the proliferation of computers in the laboratory. "I still have my slide rule somewhere, but I can't remember the last time I used it."

The department has at least tripled in size, and the student body today includes more women and minorities than it did when Groves started there.

"Professor Groves stood by our side for three to four hour stretches and explained everything thoroughly," said Cynthia Duncan, a senior in chemical engineering. "We could always count on him. He was here early for every class."

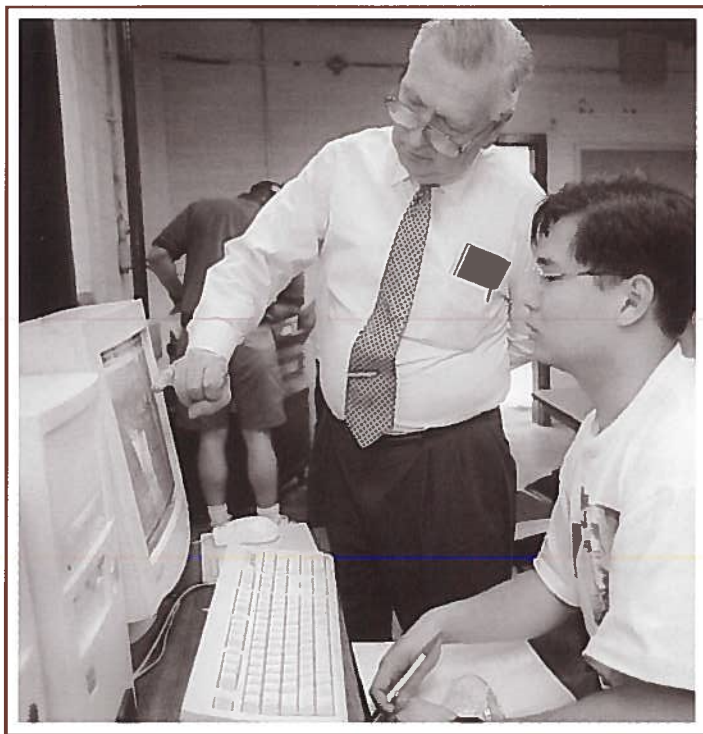
The professor's personal life has evolved through his career, too. He met Margaret Hodge when he was working in Dallas, and they were married for 40 years before she died last year. Their son, Frank D. Groves, is an assistant professor teaching epidemiology at a medical college in South Carolina.

In his spare time, Groves said he enjoys traveling, reading, and going to plays and operas. He also tutors high school students in math and science once a week at St. John's United Methodist Church.

Retirement meant a slight change of pace for Groves, who decreased his teaching load and now only does research that interests him personally. "It means I don't have to go to faculty meetings anymore, and except for my class commitment, I can come and go as I please. But I continue to come in every day, even in the summer. No one who knows me was really surprised that I stayed on. This is where I want to be. It keeps me young."

"Frank Groves is the best teacher I have ever seen," said Ron Rousseau, a well-known chemical engineer who wrote the most widely-used college textbook on the subject and was inducted in the department's Hall of Distinction in 1991.

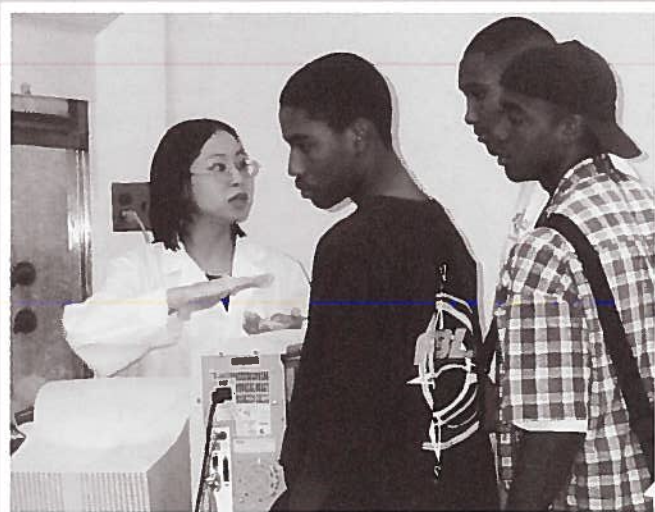
"Groves wasn't flashy . . . however, at the end of the semester, we would be astounded at the ground we had covered. I'll never forget the semester I took graduate thermodynamics. We covered everything from classical first- and second-law material to phase equilibria to statistical thermodynamics, and we never felt rushed. How did he do that? If I could only answer that question, perhaps my students would appreciate my teaching the way I do Frank's."



▲ **LSU CHEMICAL ENGINEERING PROFESSOR FRANK R. GROVES, JR., WORKS WITH HAN-KUANG TAN ON A PH CONTROL EXPERIMENT IN SENIOR LAB.**

Advocate staff photo by Jill Snyder

Baton Rouge high school students visit the Gordon A. and Mary Cain Department of Chemical Engineering, courtesy of the LSU Chapter of NSBE.



Faculty News

Armando Corripio awaits the publication of the textbook *Tuning of Industrial Control Systems*, put to press at Research Triangle Park Publications. He also submitted his article "Dynamic Neural Networks Partial Least Squares (DNNPLS) Identification of Multivariable Processes" to *Computers and Chemical Engineering*. Corripio continues his work with **Douglas Harrison** on their project "Sorbent Energy Transfer System (SETS) for CO₂ Control."

The paper "High-Pressure Molding and Carbonation of Cementitious Materials" by **Kerry Dooley**, **Carl Knopf**, and coworkers was published in *Industrial and Engineering Chemistry Research* (v.38, 2641, 1999). It describes a new method to rapidly carbonate various cements during molding, greatly reducing surface pH while accelerating set. They have a patent application on the process pending, and recently completed a project for the Department of Energy to employ such materials as artificial reefs and for reef repair. Dooley presented this paper and another on catalysis of ketonization by rare-earth oxides at the Fall AIChE meeting in Dallas.

Douglas Harrison continues his work on combining steam-methane reforming, water-gas shift and CO₂ removal in a single-step process for H₂ production, in conjunction with the Department of Energy. Harrison has also submitted a proposal to look at high efficiency desulfurization of synthetic gases.

Michael Henson was named an associate editor for the *Journal of Process Control* and served on a National Science Foundation review panel for the Foundation's Small Business Initiative Program on Process Control. He has also been named to the International Program Committee of three process control conferences, published three journal papers, and given seven seminar presentations. Henson has continued ongoing research projects funded by the NSF, ExxonMobil Chemical, Praxair, and DuPont, while serving the chemical engineering department as an undergraduate adviser, graduate recruiting coordinator, and seminar series coordinator.

Martin Hjørstø presented several papers during the last semester, including "A Model Predictive Control Strategy for Stabilization of Oscillating Yeast Cultures" at the International

Symposium on Advanced Control of Chemical Processes in Pisa, Italy. He also copresented the following papers with Michael Henson: "Deciphering the Mechanisms of Autonomous Microbial Oscillations" at the Engineering Foundation Conference on Population Balance Modeling and Applications in Hawaii; "Use of Oscillating Cultures for Identification of Fermentation Models" at the annual American Chemical Society meeting in San Francisco; and "Bifurcation Analysis and Control of Yeast Cultures in Continuous Bioreactors" at the American Control Conference in Chicago.

Kalliat Valsaraj has recently obtained a grant from the Environmental Protection Agency to study the photodegradation and adsorbilization of organic compounds from dilute wastewater streams. A new facility for solvent sublimation based on his research work is presently being constructed at Borden Chemicals and Plastics in Geismar, Louisiana, and will come on-line later this year. Valsaraj has had the second edition of his textbook *Elements of Environmental Engineering* published by CRC Press in March this year. He is presently hosting in his laboratory Yuan Qingzhong, a

visiting scholar from the department of chemical engineering, Shangdong Institute of Light Industry, People's Republic of China.

David Wetzel has begun collaboration on an undergraduate research project "Transport of Cutting in Horizontal Well Drilling" for later publication.

Faculty Awards

Armando Corripio and **Douglas P. Harrison** received funding from TDA Research for their project "A Novel Hydrogen/Oxygen Generation System."

Kerry Dooley was awarded \$65,000 from EagleView Technologies and MGK Co. to study catalytic ketonization and partial oxidation processes.

Douglas P. Harrison received the Masuda Research Fellowship award.

Geoffrey L. Price and **Kerry M. Dooley** were awarded \$85,000 by ExxonMobil Chemical to prepare and study new catalysts for aromatic carbonylation.



Student News

SPRING 2000 COMMENCEMENT

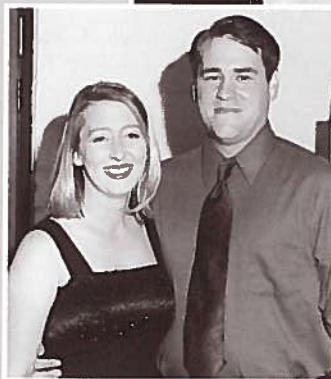
BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

Natika Holmes Anderson
 Bryan Thomas Arnette
 Matthew Thomas Balhoff
 Laura Hanckes Castle
 Louis Oved Chemin III
 Timothy Eamiguel Dawag
 Melissa Kay Dillon
 Megahn Ann Dumas
 Laura Lynn Durst
 Robert Thomas Durst
 Craig Allen Earnest
 John B. Edel
 David Elliot Farritor
 Oscar René Flores
 Christian Douglas Freet
 Jeremy L Goebel
 Donald Francis Hebert, Jr.
 Christopher Robert Holloway
 Ching-Soon Lim
 Corey Matthew Louque
 Andrea Dawn Mattson

Jeffrey Davis Maynor
 Byron Francis McCaughey
 David Sullivan McGraw
 Robin Lea McNeely
 Melanie Beth Mitchum
 Michael Aaron Mullins
 Annette Accardo Murnane
 Tien Anh Nguyen
 Aatish Yogesh Patel
 Dianna Leigh Pourciau
 Stephen Dennis Pudlewski
 Donna Renae Schlotzhauer
 Scott Michael Steady
 Bryan Hays Talbert
 Han-Kuang Tan
 Stephen Christopher Thompson
 Katherine Celeste Toney
 Scott Michael Van Wagener
 Christopher Foy Yandell
 Grettel Iveth Zamora Estrada



▲ **THE BALHOFFS**—SON **MATT (MIDDLE)**, FATHER **JOHN F. (LEFT)**, AND GRANDFATHER **JOHN T. (RIGHT)**—REPRESENT THREE GENERATIONS OF LSU CHEMICAL ENGINEERING GRADUATES.



◀ **LAURA AND ROBERT DURST CELEBRATE MARRIED LIFE AS LSU CHEMICAL ENGINEERING GRADUATES.**

MASTER OF SCIENCE IN CHEMICAL ENGINEERING

Karl Thomas Duckworth Jay Allen Schwarzhoff



1999–2000 SCHOLARSHIP RECIPIENTS

AMERICAN CHEMICAL SOCIETY
SCHOLARSHIP

Regina Bergeron

B.P. AMOCO SCHOLARSHIP

Rusty J. Dauzat
Jeff D. MaynorCHEMICAL ENGINEERING
SCHOLARSHIPLaura Castle
Robert K. Damon
John A. DiZinno
Craig A. Earnest
Dianna L. Pourciau
Benjamin P. TemplettCHEVRON USA PRODUCTION
SCHOLARSHIPJeremy L. Goebel
Scott M. SteadyO. DEWITT DUNCAN
SCHOLARSHIPDwight P. Bordelon
Kristin D. Rabalais
Anthony S. Rotolo

GERARD FAMILY SCHOLARSHIP

Christian P. Aucoin
Matthew T. Balhoff
Burl W. Duffie
Christopher R. Holloway
Rebecca J. Lorenz
Melanie B. Mitchum
Byron F. McCaughey
Carolyn A. Melton
Kathrine C. ToneyI. H. GOTTLEIB MEMORIAL
SCHOLARSHIP

Annette A. Murnane

FRANK & CLARA GROVES
SCHOLARSHIP

Christopher J. Burke

MARATHON ASHLAND
SCHOLARSHIPShannon L. Frith
David S. McGraw
Barry M. RoggeWILLIAM E. MCFATTER
SCHOLARSHIP

Darren J. Marchal

TEXACO SCHOLARSHIP

Louis O. Chemin III
Jeremy D. Cyr
Travis C. LaneVULCAN CHEMICAL
SCHOLARSHIP

Christopher F. Yandell

AICHE NEWS

During the spring semester, BASF donated \$5,000 to the LSU student chapter of the American Institute of Chemical Engineers (AIChE). The money was used to renovate the Student Lounge, which is now furnished with a table and chairs for studying, and a new couch. As a reminder of BASF's generosity, pictures of the company's sites in Louisiana, New Jersey, and Germany hang on the walls. The group expresses its thanks to BASF for their support.

Freshman Michelle Bibbins won third place in the research paper competition at

the Southern Regional AIChE conference. LSU chapter members attended the conference in Lexington, Kentucky, in April. In addition to plant tours, officers meetings, and an industrial job fair, AIChE members also experienced the excitement of opening day of the horse-racing season in Lexington.

Awards were presented at the annual Dow Crawfish Boil on April 15. Student winners included Katherine Toney, Louis Chemin, Matt Balhoff, and Jennifer Pusch. Professor Douglas Harrison was also honored with the Dow Outstanding Faculty Award.

2000–2001 AIChE
Student Chapter
Officers*President*

Becky Lorenz

Vice President

Scott Crowell

Faculty Adviser

Karsten Thompson

Alumni Updates

If you would like for us to print news of your latest achievements, please complete the enclosed card and return it to us or send us an e-mail at broussard@che.lsu.edu

1930s

Thomas Shelton Boggess (B.S. '34, M.S. '36) still participates as associate professor emeritus of food science at the University of Georgia. One of his favorite pastimes is wine-making.

Arthur E. Reed (B.S. '38) is retired and living in Bogalusa, Louisiana.

1940s

Charles Clifford Cameron (B.S. '42) is retired from the private sector, but he's still a busy man. He is on the Board of Governors for the University of North Carolina, as well as trustee for Wake Forest University, and is the Chairman of University Research Park.

We were saddened to hear that **J. D. Wall** (B.S. '43) passed away many years ago. Our belated, but deepest, sympathy goes to his family and friends.

1950s

Donald M. Bordelon (B.S. '56) retired from Farmland Industrial in 1998. He and his wife live in Lakeland, Florida, and enjoy traveling, volunteering at their local adult literacy program, and spoiling their grandchildren.

Edwin Malcolm Harvey (B.S. '50) retired from the Ethyl Corporation. He and his wife enjoy foreign and domestic travel, camping, and many other activities at the Westley Woods Retirement Center in Newnan, Georgia.

1960s

Joseph A. Kleinpeter (B.S. '65) is the director of telecommunications for the DuPont Corporation in Wilmington, Delaware. He has been working in the information technology branch of DuPont since 1985.

Nolan M. Rome (B.S. '62) has retired after 38 years in the oil and natural gas

industry. He spent the last 20 years of his career working with Mobil Oil as a business adviser for natural gas processing. He and his wife will remain in Kingwood, Texas.

Leonard H. Sedlin (B.S. '61) is retiring from his career as an environmental engineering consultant with Conestoga-Rovers & Associates, Inc. He was recently honored by the College of Engineering at the University of Alabama as one of this year's Distinguished Engineering Fellows.

Kirby W. Smith, Jr. (B.S. '67) is the manager of business development for the Walk Haydel-URS offices located in Lake Charles, Louisiana.

1970s

George M. Lane (B.S. '70) recently received a NASA Research Fellowship from the Stennis Space Center in Mississippi. The grant will fund his doctoral program research in environmental toxicology.

Kelvin E. Langlois (B.S. '77) is working at Cytec Industries in Texas, as a process safety engineer.

Patrick J. O'Neill (B.S. '77) is the operations manager at the Alliance Refinery of BP-Amoco in Belle Chasse, Louisiana.

David Nelson (B.S. '78) now works for Tyler Oil & Gas, an independent oil and gas producer, in East Texas.

1980s

Marjorie F. Ferguson (B.S. '84) received her M.B.A. in 1986 and was recently promoted to principal process engineer in the Oil, Gas, and Pipeline division of Fluor Daniel, Inc., in Sugarland, Texas.

Narinder Lakhani (M.S. '82) is living in Saudi Arabia and working as the professional services manager at the Riyadh offices of IBM.

1990s

Femi Adebisi (Ph.D. '99) works in the e-commerce department of Andersen Con-

sulting in Houston, Texas. He is currently developing the front-end and back-end systems of a web order entry tool for a crude pipeline company.

Brandon W. Bello (B.S. '97) recently began working at Dow Chemical in Plaquemine, Louisiana. He, his wife, Heather, and their newborn daughter, Aubrey Layne, have just moved back to Baton Rouge.

John Golda (B.S. '96) and **Yvette Morgan Golda** (B.S. '96) are living in Baton Rouge, Louisiana. John works as a operations engineer at ExxonMobil, and Yvette is working on the design team for the new MEA plant that Albemarle is building near Beijing, China. The Goldas enjoyed a 10-day whirlwind tour of France and England earlier this year.

Brad Michael Martin (B.S. '93) is the production manager for LaRoche Industries in Lutcher, Louisiana. Like all good alumni, he keeps up with LSU sports. Brad also recently celebrated getting married.

Gustavo Paredes (B.S. '97) is a service sales specialist for the Industrial Control division of the Andean Region for Honeywell International.

Adrian B. Sherrill (B.S. '96) is a graduate student at the University of Delaware.

James L. Smith (M.S. '94) is the air quality department manager for URS Corporation in Houston, Texas.

David S. Stafford (B.S. '99) works as a chemical engineer for Cytec in Westwego, Louisiana, and resides in Independence, Louisiana.

Yiding Neil Zeng (Ph.D. '99) works at Ford Motor Company in Dearborn, Michigan, as a product design engineer. He enjoys the automotive industry and is currently developing a system approach to target the California SULEV-II emission standard.

LOST ALUMNI

WE NEED YOUR HELP:

We would like to thank the treasured alumni who forward up-to-date information and current addresses for both themselves and others. Although many of our past graduates can be located easily thanks to the Internet, there remains a surprisingly large number of alumni that simply cannot be found.

Even though chemical engineering employment opportunities sometimes require an extremely volatile lifestyle, many of our graduates keep in touch years after the excitement of the diploma ceremony has waned. If you happen to know any information regarding the following alumni, please contact us. We would like to send a newsletter to as many of our graduates as possible.

1931

Robert E. Schexnaider

1933

Russell N. Lay
Lawrence O. Lord

1934

Phillip J. Bertin
Reginald N. Blaize
Samuel R. Fitzgerald
James E. Lindsay
Ellsworth N. Smith

1935

Henry P. Broussard
Mary L. Digirolamo
Charles E. Gill
Hamilton M. Johnson
Richard A. Pratt
M. R. S. Rao
Frank w. Valls
Guy G. Vande pool

1936

Lealand A. Enberg
Louise T. Kennedy
James Hardie McGee
Francisco Pepito Pilapil
Alvin D. Rolufs

1937

John Lucious Burt
Delma McCabe Cointment
Angel Alberto Colon
Eugene E. Ellis, Sr.
Richard L. Hodges
Edwin Liebert
Morris Leonard Perlman
William Everitt Rowbotham
Robert Boyd Stewart
M. R. Subra
William Owen Switzer

1938

James Camille Aucoin
William Yeoman Gissel

Charles Edwin Going
Walter Hudson Johnson
Gangadhar Dinker Kane
Otis Bernard Rowland
Herman Siegel

1939

George Timothy Mercier
Sidney Schulder
David Connell Walsh

1940

Henry Blanchet
James Wilson Bridges
Edward Stirling Johnson
Y. Ebra Jose
James V. Senese

1941

Harry Clair Cole
Charles Arthur Overstreet
Willis Wilcox Williams

1942

William Fowler Daniels
Gilbert Fletcher Moore
James Stanton Patterson

1943

Robert Emmett O'Connor
George Albert Speir

1944

Manuel Mestre
Jack William Racine

1945

Armando Alonso
Juan Castresana
Karl Albert Muller
Charles Bernard Richard

1947

George Charles Conrad
Thomas Harper Goodgame

1948

William B. Chancellor
Edward O'Donnell
Charles Joseph Perilloux
Dwaraknath Reddy
Richard Weldon Waldsmith
Stephen A. Winborn

1949

Maurice Gordon Baxter
Richard Cameron Berry
Thomas Fulton Burke
Edmund Pettus Davis
Billy Joe Grady
Thomas Moody Logan
John Rurick Major
Pablo Navarrete Vaillant
Bruce Eugene White
Ben Allen Willard

1950

Harish Chandra Anand
Earl Paul Babin
Raul Victor Capote
Vincente Carreto de la Mora
Albert Lacy Fourmy
Gene Armond Freiss
Juan Ignacio Gabilondo
Prasanna C. Goswami
Boyce Nunnally
Clarence Earl Phillips
Robert Denton Platt
Wilson Clyde Pullig
Theodore Russell Ray
Osvaldo R. Rodriguez
Jose Sales
Claude Joe Stiles
Manuel Fausto Villapol

1951

Basil Wayne Andrews
Martinez Ricardo Felix
Ruble Landis Huff
Lonnie Zach Mallory
Jimmy Edgar Middleton
Pramod Lal Sarma
Arthur Wellington Sellers
Elvin Andrew Stafford

1952

Omar Arape
Fernando Hoyos Bergonzoli
Frank B. Clary
Eugene E. Ellis, Jr.
Raymond Raffray
Andre Edward Rouillard
John Dempsey Stokes

1953

Mansour Ghadar
Riyad Abdallah Khalaf

1954

Philip Earl Brubaker
Robert W. Duhl
John B. Fontenot
Kenneth Odell Halbhook
Gene Addison Johnson
Humberto Pinheiro Machado
Jose Antonio Moncada
Freeman Louis Morgan
Mario Posada
Kenneth L. White

1955

Zevada M. Avalos
Albert Kennedy DeFrance
Wiley B. Fisackerly
George Mathieu Guidroz
Stanley Dison Hanesworth
Raymond Calvin Hatfield
Guy Clifton McCombs
Wilhelmus Melis
Patrick Gerald Simms
Ezra Jasper Westbrook
George W. Wright

1956

Thomas W. Howard
Kenneth Hoy
Robert Pole

1957

Philip Dominic Accardo
Yeganeh A. Amir
Jose A. Chapman

Rafael Jorge Garcia
 Frederick Eugene Marsh, Jr.
 Norwood William Matherne
 John William Maurin
 Felix Fortune Planche
 Walter James Porter
 Silva Joaquin Sanchez
 Regulo Atilio Sardi
 Harold Alfred Simms
 Luis Alberto Wallis
 Ignacio Warner

1958

Joseph M.P.H. Adam
 Augustine Joseph Corona
 Harry Alonzo Edwards
 Robert L. Evans
 Bernard J. Goussault
 Paul Joseph Gravel
 Franklin Murry Ingram
 Mohan Singh Kothari
 Ferdinand Louis Larue
 Euclide Howard Leleux
 Jean Pierre Mariani
 William Claborn Meek
 Bobby Morgan Miller
 Maurice Khalil Nasser
 Joseph Marie Pierre
 Joseph T. Regard

1959

Charles Ellis Adams
 James Kernon Crochet
 Jai Narain Goel
 Willard Milton Hanks
 Thomas Charles James
 Paul Richard James
 Harold Douglas Jelks
 Robert Harley Jines
 Gerald W. Kattong
 Habib Labbauv
 Freddy W. Landae
 John Morgan Webre

1960

Charles Edwin Beckler
 Ronald G. Corley
 Ronald Anthony DeJean
 George Paul Distefano
 Jose L. Fuertes
 Sebert Albert Haynes
 Charles Emory Knight
 Robert W. Lacour
 William Francis Lanigan
 Michael Joseph Maurin
 Jose Leandro Mendez
 John L. Morrison
 Larry Joseph Remont
 Calvin Antoine Rousse
 Cacques L. Saudy
 Raphael Toufic Smayra
 Shwen Ih Wang

John Wurster Wheeler
 Hugh Glenn Wilson
 Don Wesley Wolsefer

1961

Heraldo A. Agreda
 Hector Joaquin Corella
 Robert Allen Davis
 Jimmy McMath Givens
 Ernest Woodard Harrison
 James Cleveland Holland
 Y Pino Jorge
 Boyd Young LeBlanc
 Humberto E. Lopez
 Sanchez Humberto Lopez
 Jose G. Lopez-Barreda
 Lewis Jerome Mayard
 Jorge A. Pino
 Fernando Xavier W. Pires
 Victor Plas
 Emilio Rebull Rivera
 Konchady Nagesh Shenoy
 Agreda Heraldo Sifontes
 William Dave Taylor
 Vincent Stephen Verneuil
 Glenn Lamar Wise
 Gary H. Young

1962

Jeff W. Baird
 Leonard M. Boudreaux
 Fred Edward Causey
 Edward Leroy Glass
 Charles Reggie Guerin
 Jack Welbur Harris
 Clovis P. Legleu
 Walter H. Plain
 James M. Shipp
 Carlos A. M. Troncoso
 Henry M. Troth
 James Vastine Valliant

1963

Jose Francisco Agreda
 Maria Z. Aguilar
 Gerald Eugene Butler
 James Leston Case
 Francisco C. Eala
 Robert Guerra
 Billy Wayne MaGee
 Frank Nemours Newchurch
 Jimmie Doyle Pottorff
 Maria Aguilar Rodriguez
 Leo Simon Sues

1964

David Gray Caddy
 Ronald Calvin
 Ivan E. Caro
 Danilo P. Castillo
 Omar J. Esmal
 James Thomas Kennison

Herbert James Louque
 James M. McCormick
 Gary Martin Montgomery
 John Louis Murray
 Motiram Kisan Patil
 Pietro K. Piralla
 Denarakonda Hanumantha Rao
 Juan Ramon Santa-Coloma
 Robert Glenn Tripp
 Jose Tito Villa

1965

Nolan Joseph Adams
 James Henry Brooks
 Malcolm Lafayette Dove
 J. Randolph Langley
 Mauricio A. Lopez
 Madhigiri S. R. Ramesh
 Richard C. Robinson
 Nora Antonia Sanchez
 Antonio Velidanes

1966

Gerardo Ten Brink
 Richard Freeman Buckley
 Orlando Felipe Cardoso
 Harold Louis Hebert
 James Edward Horn
 David Wesley Miner
 Pedro Joaquin Nogueira
 Bueno Jaime Porres
 Sims Louis Roy
 Mario Moises Salinas
 Richard Joseph St. Pierre

1967

Richard G. Beecher
 Raul Cardenas
 James H. Doub
 Joseph Larry Edmonson
 Howard Morelock Elder
 Gilbert Stevens Fox
 Ronald E. Jones
 Wilbert S. Mackay
 Hooshang S. Moghani

1968

Michael Taylor Edgerton
 Donald D. Esch
 Jerry W. Fisher
 Ricardo J. Gomez
 Guy J. Harel
 Randall John Indovina
 Ronnie D. Jackson
 Julio C. Padilla
 Kenneth J. Parent
 Robert D. Schultz

1969

Antonio D-Aurrecoch
 Jose J. Aquirre

Yu-Chin Liu Chen
 Alvin A. Fairburn
 John Randolph Langley
 Yu-Chin Liu
 James Ray McClelland
 Ivan A. Navarro
 Juan C. Salazar

1970

Alvaro Campuzano

1971

Sain D. Anand
 Michael John Atchete
 Jose F. Azouth
 Leroy Joseph Cavaliere
 Richard Edwin Dorris
 Carl David Engel
 Segundo Fernandez
 Charles Goodson Guffey
 Simon Hacker
 Mark Austin Jeffers
 James Vincent Jurasinski
 Ronald Dean Miles
 Danny J. Perrerr
 Glen Dale Savoy
 William Alden Settoon
 Vinodchandra R. Shah
 Marlin Rufus Vernon

1972

Juan F. Ardila
 Robert John Camacho
 Bernad C. Chan
 Frank R. Cusimano
 T. Augustin David
 Michael Michaud
 Robert Wade Moore
 Jose Rafael Morao
 Marshall Budd Nelson
 Richard Wayne Nill
 Sanford James Stinnett
 Wing Yan Woo

1973

Denzel Allen Brown
 Justin Dwight Edwards
 Olivier Damianus Habibe
 Hsiao-Nan Huang
 Mohammad Reza Karbassian
 Ronald Jules Manuel
 Richard Lee McGlamery
 Madhusudan Nathany
 Mehmet Ozbay Ozelsel
 Lokesh H. Parikh
 Anan Siripong
 Roger Earl Waguespack
 Emilio Ramon Zarruk

1974

Jamal Al-Din Barzinji
 Mohamad B. Behbehani

Galen M. Dino
 Frank Darral Durringer
 Aurelio B. Dutary
 Hafez Hafezzadeh
 Sohan Lal Khungar
 Mostafa Mina
 Lowery Wayne Paxton
 Oscar Ivan Pinilla
 Najmeh Sadighi-Nouri
 Suresh Mansukhlal Vora

1975

Carlos Manuel Acevedo
 Rabie Ahdoor
 John Allen Alexander
 William H. Kampen
 Mohammad Ali Movahed
 Ahmad Sharonizade
 Paul Timothy Siegmund

1976

Stephen William Krajicek
 Frederick Henry Pitts
 McClellan Milton Walther

1977

Owaraknath Reddy

1978

Charles Germano

1979

Manuel A. Arguello
 Ender J. Ferrer
 Daniel Eugene Fields

Steven Paul Haynie
 Le N. Hue
 Jamaledin Madjdpour
 Carl E. Sladek
 Tuan A. Tang
 Beth Maria Troxler

1980

Mary E. Ahner
 Villa D. Holland
 Duc M. Pho
 F. R. Roberts
 Edward A. Thistlethwaite
 Labrador Angela Vitelli
 Martin K. Wiewiorowski

1981

James Albert Devereux
 Larry Michael Hall
 Edgar Hernandez
 Joel H. Keiffer
 Gwendelyen A. Mayeux
 Andrew C. Mok

1982

Patrick B. Broderick
 Jean E. Carvajal
 Janet Elizabeth Cox
 James Douglas Griffin
 Richard David Jordan
 Joseph Khalk Koro
 Roger Allen Miller
 Jaime A. Pineda
 Thomas Anthony Stroud

1983

Daniel Mark Brignac
 Lawrence T. Faucheux
 Lily Gunawan
 Julie Ann Niermann
 Randall D. Roddivek
 Matthew Lee Schuette
 Sharron R. Woodall

1984

Neftaly E. Rodriguez
 Susan K. Snodgrass
 Paul Eugene Yonts

1985

Andreas Phoebus Constantinides
 Mohamad Kheir S. Habbal
 Corey A. Hay
 Robert D. Moore

1986

Kigham Seropp Yeretzyan

1987

Sheng-Yang Ju

1988

Yangtzu Chao
 James Walton Gilliland
 David E. Cockrill

1989

John Anthony. King
 Michael R. Landry
 Mark Eric Malhiet
 Jacob Thomas

1990

Dhananjay B. Ghonasgi
 Mark Edward McDaniels

1991

Sriram Gangadharan

1993

Seungdo Kim

1994

Jianxin Hu

1995

Xuxian Niu

1997

Narendra Borgharkar
 Moh Fahrurrozi
 Wu-Ning Huang

1998

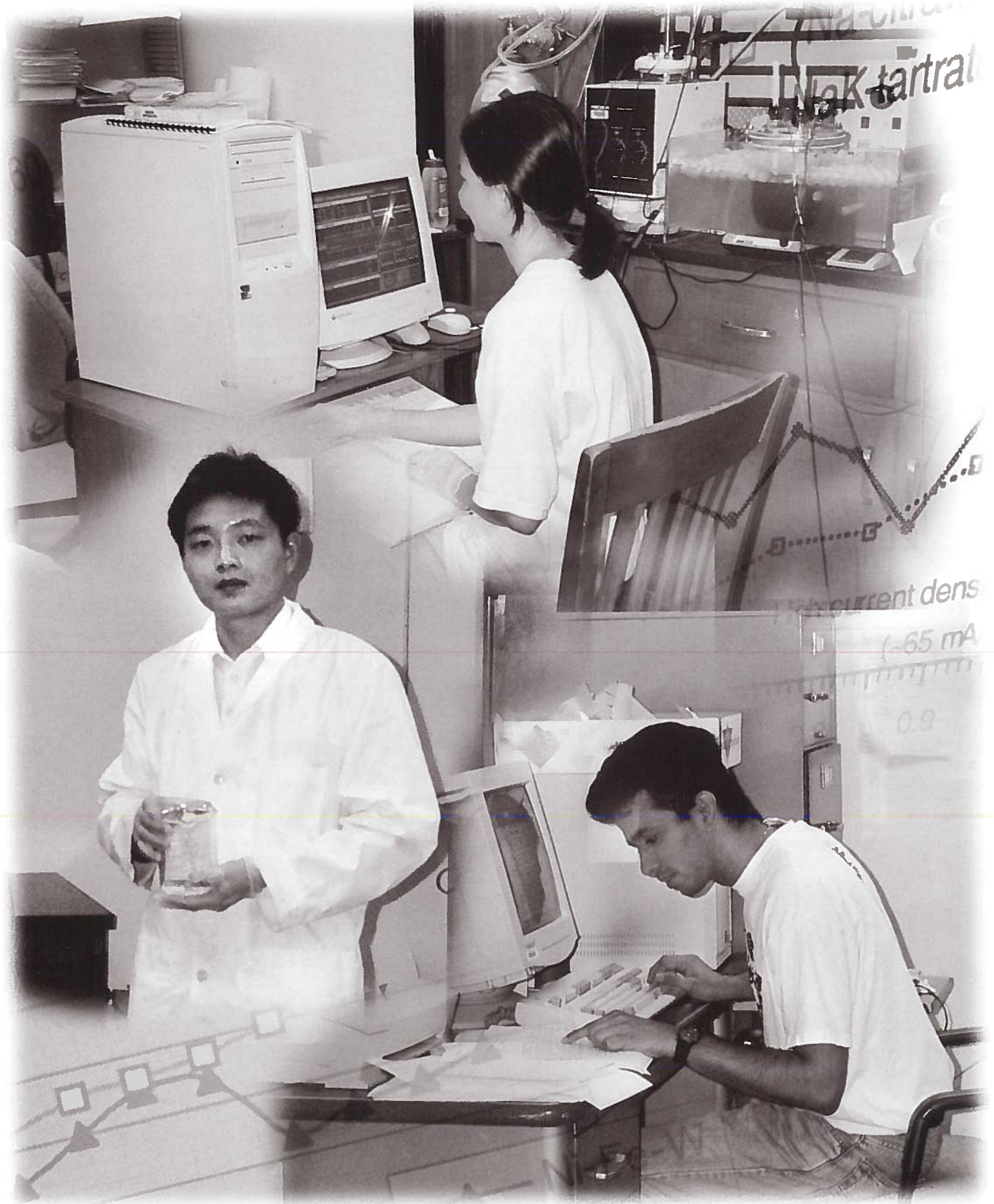
Xueyu Chen

1999

Hertanto Adidharma
 Benjamin Broussert

Notice

EFFECTIVE NOVEMBER 15, 2001, telephone service at LSU will officially convert to a new exchange. All numbers with 388 exchanges will be reassigned the same last four digits, but with a 578 exchange (which spells "LSU"). Administrative numbers with 334 or 346 exchanges will be assigned new numbers with the 578 exchange. Residence hall telephones will retain the 334 exchange.





LOUISIANA STATE UNIVERSITY

*Gordon A. & Mary Cain Department of
Chemical Engineering*
Baton Rouge, LA 70803-7020

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