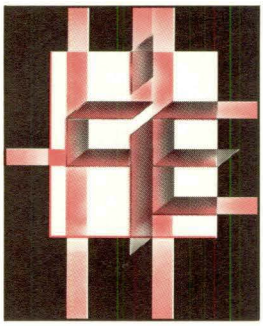
Winter 1989

ITEMS

UNIVERSITY OF MINNESOTA
INSTITUTE OF TECHNOLOGY

When surfaces collide

Pp. 6-9



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Features

Departments

ITEMS

University of Minnesota Institute of Technology

Winter 1989

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Items is published three times a year to inform Institute of Technology alumni and friends about news, interesting alumni and faculty, and relevant issues. Letters to the editor, requests to receive *Items*, and notices of address changes should be sent to the Office of External Relations, Institute of Technology, 107 Walter Library, 117 Pleasant St. S.E., University of Minnesota, Minneapolis, MN 55455. *Items* welcomes letters and ideas from all readers.

This issue was prepared with the assistance of University Relations.

NEWS

Hot flame of plasma gas ignites industry

Consider one very hot, partially ionized, electrically charged gas called plasma. Discovered more than 200 years ago, it remained a curious untapped resource for some time.

In fact, for quite a long time. Only within the past 10 years have scientists begun to find the industrial applications of plasma —from welding and cutting to the production of high-tech ceramic materials. "The time is now ripe for using these plasmas on a much wider scale," says mechanical engineering professor Emil Pfender.

A highly interdisciplinary field, plasma technology involves everything from thermodynamics to materials science, Pfender explains. Only a few labs in the world conduct plasma research, including Pfender's, which is nine years old. Recently, his lab, along with one at the University of Wisconsin in Madison, received a grant from the National Science Foundation to explore the industrial applications of plasmas.

The five-year, $12 million grant establishes an Engineering Research Center on Plasma-Aided Manufacturing, which will be jointly operated by the University of Wisconsin and the University of Minnesota. Pfender's lab will handle about 20 percent of the research.

Plasma acts as a tool for making high-tech industrial materials and for aiding standard industrial processes. The plasma gas, emitted from a plasma torch in the form of a flame, "looks like a combustion flame"; but at more than 10,000 degrees Celsius, it is much hotter, Pfender says.

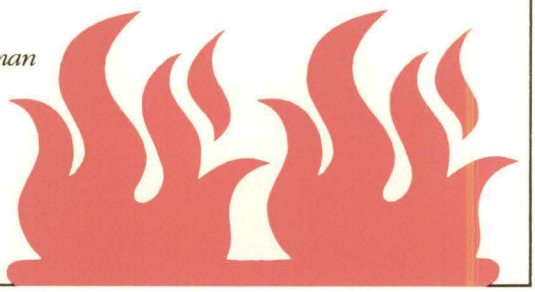
Two emerging technological fields benefit from the flame of plasma gas. Plasma synthesis and plasma sintering involve the production of fine powders and of solid bodies of high-tech ceramic materials. Found in everything from the coatings on thermocombustion engines to body parts for implants, these ceramic materials resist corrosion and can withstand extremely high temperatures.

Since the '60s, scientists have been testing materials exposed to high temperatures. The space program, for example, needed a heat-resistant material to coat the nose cone of vehicles reentering the Earth's atmosphere. Ceramics made with plasma do just that. They have other applications as well. An airplane turbine blade coated with a plasma material lasts substantially longer than an uncoated blade, Pfender explains.

Industry is not sitting idly by while Pfender works in his lab. An industrial consortium of more than 30 companies, including 3M and Honeywell, contributes to his research efforts. Pfender meets with consortium members, many of whom already use plasmas in manufacturing projects. Others involved include assistant professor Steven Girshick, two research associates, and 14 graduate students.

"We hope that this technology can be transferred to industry for commercial purposes, as well as to aid existing technologies," Pfender says. I

By Miriam Feldman



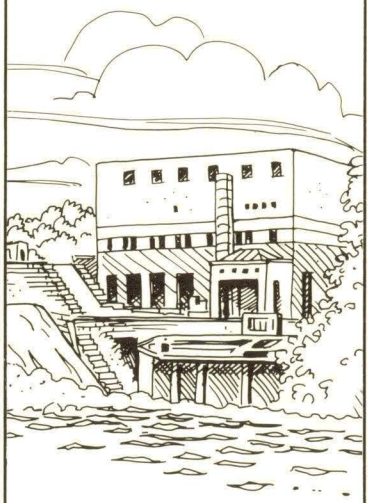
Noted

Computer science major Duane Binder is the first recipient of the Donald J. Herman Scholarship, established by NCR Comten in September. Named for the co-founder and former president of the St. Paul-based company, the scholarship annually awards $1,000 to an outstanding junior or senior majoring in electrical engineering or computer science. Binder's award was matched by Herman for a total of $2,000. ■ The AT&T Foundation awarded grants to two IT departments in October. Electrical engineering will use its $20,280 for equipment to test and refine fast multidimensional signal processing algorithms; computer science received $14,720 to add advanced graphics subsystems to its existing laboratory machines. ■ The School of Earth Sciences was renamed the Newton Horace Winchell

Photo courtesy of University Archives

Newton Horace Winchell

School of Earth Sciences in November in honor of the founder and first head of the Minnesota Geological Survey. Winchell, also first head of the geology and geophysics department and a founder of the Geological Society of America, died in 1914. ■ David T. Grimsrud (Physics 1963 M.S., 1965 Ph.D.), former head of the indoor environment program at the University of California's Lawrence Berkeley Laboratory, became director of the Cold Climate Building Research Center in January. ■ The Charles Babbage Institute sponsored a lecture by Allen Newell, first president of the American Association for Artificial Intelligence, in October. ■ Eugene C. Figg, Jr., president and CEO of Figg and Muller Engineers Inc., delivered the second annual Katherine and Arthur Sehlin Lecture, on functional and aesthetically pleasing bridges, in conjunction with the civil and mineral engineering department's November open house. ■ Albert Eschenmoser, professor in the Laboratory for Organic Chemistry at the Eidgenössische Technische Hochschule, Zurich, Switzerland, was the speaker for the 1988 fall quarter Kolthoff Lectureship in Chemistry. ■ St. Anthony Falls Hydraulic Laboratory's 50th



anniversary celebration in September featured dedication of the new boundary-layer wind tunnel, a speech by Gov. Rudy Perpich, and a symposium on the hydraulic laboratory's role in the 21st century. ■ Jeffrey Zelt, who completed his Ph.D. at the California Institute of Technology, received the Lorenz G. Straub Award from SAFHL in September for his hydraulic engineering thesis. ■ The University's American Society of Civil Engineers student chapter received honorable mention for meritorious activities during 1987 from the society. ■ Nonlinear waves is the 1988-89 theme of the Institute for Mathematics and its Applications. I

MEIS equips microelectronics lab

In January, the Microelectronic and Information Sciences Center (MEIS) began installing equipment for the new IT Microelectronics Laboratory in the Electrical Engineering and Computer Science Building. The lab will include a Riber Molecular Beam Epitaxy system, a Varian electron beam pattern generator, and several diffusion furnaces, and should be fully functional late in 1989. MEIS will hold an open house for the lab next fall. I

BRAVE NEW COMPUTERS
S&T Day featured talk by Apple CEO

You enter your office late in the morning and ask for messages. A friendly face—part of a sophisticated computer/telecommunications system on your desk—announces that an important business contact called from England. With one verbal command, the business contact appears live on your desk screen, along with maps, charts, and other information you need for your telephone meeting.

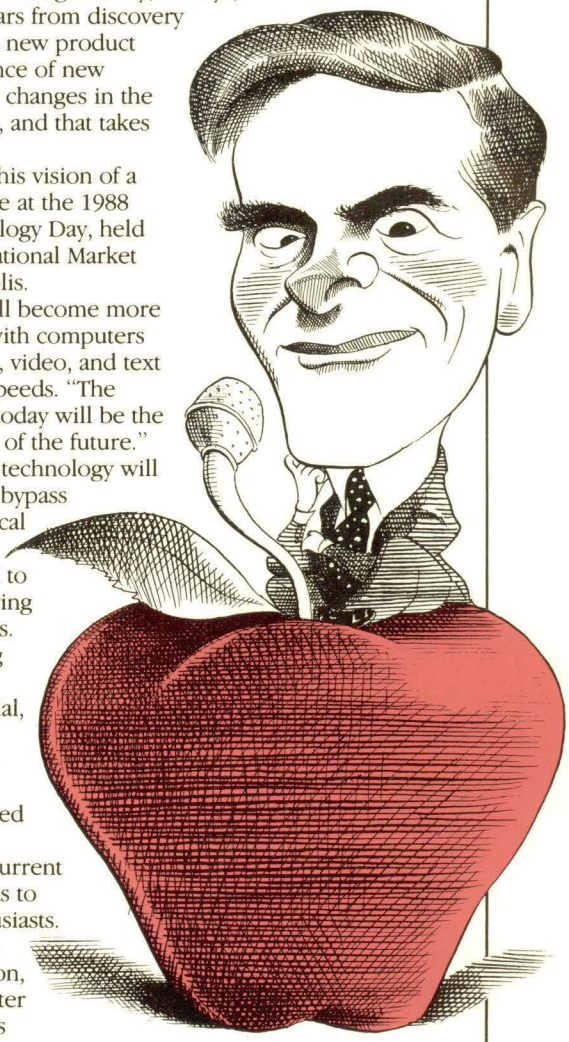
The technologies for realizing this scenario exist now, according to John Sculley, chair and chief executive officer of Apple Computer Inc. But generally, he says, it takes nearly 15 years from discovery of the technology to new product availability. Acceptance of new technology requires changes in the behavior of humans, and that takes time.

Sculley shared his vision of a not-too-distant future at the 1988 Science and Technology Day, held October 4 at International Market Square in Minneapolis.

"Computing will become more versatile," he says, with computers that combine sound, video, and text and work at faster speeds. "The supercomputers of today will be the personal computers of the future."

Such advanced technology will allow individuals to bypass traditional hierarchical structures, to act instantaneously, and to change work and living patterns, Sculley says. The relatively young computer industry shows much potential, and could spark a renaissance—much as the invention of movable type changed society, he says.

Sculley likens current computer enthusiasts to early machine enthusiasts. What the machine is to mass transportation, the personal computer may become to mass information, he says.



News to p. 4

The United States, though, faces stiff competition in the future marketplace. "Japan has been redefining our expectations of quality," improving a wide variety of existing products. "We should be thinking about how to beat Japan in the context of an information age."

Sculley advocates a strong public education system and on-the-job training as keys to future economic success. The United States must invest in public education and help students build conceptual skills. In addition, Sculley says, people must consider education a lifelong process.

More than 900 people attended S&T Day, which also serves as the annual meeting for the Institute of Technology Alumni Society (ITAS). Former ITAS president Kris Black passed the gavel to Russell Susag, who earned bachelor's, master's, and Ph.D. degrees in civil engineering.

"ITAS is a well-organized machine," offering many ongoing activities that include S&T Day, seminars, dean and department head receptions, and sponsorship of student scholarships, says Susag. This year, Susag hopes ITAS will take the lead in recognizing the outstanding achievements of alumni and in reinforcing among IT alumni the importance of "a strong IT within a strong University to the economic health of Minnesota." I

By Darlene Gorrill

Pfleider chair now a permanent fixture

The family of Theodore W. Bennett (Geology 1931) has permanently endowed the Eugene P. Pfleider Chair in Mining Engineering and Rock Mechanics.

A 10-year (1981-1990) commitment from the Bennett family currently funds the Pfleider chair in the civil and mineral engineering department. As part of the Minnesota Campaign, the Theodore W. Bennett Trust has pledged an additional $500,000, to be paid through 1995. The Permanent University Fund will match this pledge two-for-one for a permanent endowment totaling approximately $1.4 million.

With its new permanent status comes a new name—as of July 1, 1991, the chair will be called the Theodore W. Bennett Chair in Mining Engineering and Rock Mechanics. Professor Charles Fairhurst, a leading authority on rock mechanics, has held the chair since 1982. Beginning in the 1992-93 academic year, appointments to the chair will be for a five-year term, with Fairhurst eligible for reappointment. I

NSF grant boosts supercomputer access

The Minnesota Supercomputer Center received a $1.5 million grant from the National Science Foundation (NSF) in October. The grant will make the center's supercomputers available for NSF-sponsored research by scientists from 10 universities, including 14 research teams from the University of Minnesota.

Founded in 1982, the center provides computer time to commercial and academic users. It was the first academic center to acquire a CRAY-1 and the first to operate a CRAY-2 (with two billion bytes of memory, the most powerful supercomputer available). The center recently acquired an ETA-10 (faster for some applications than even the CRAY-2) from Control Data's ETA Systems Inc. I

REUNIONS

Class of '38 fetes 50th

Fifty years after graduating from the University, more than 60 alumni returned to campus with spouses and guests for the 1938 class reunion. Held October 4-8, the reunion featured a reception and dinner at the University Radisson Hotel, where class members reminisced, renewed friendships, and enjoyed professor emeritus Fulton Holtby's recollections of teaching freshman members of the class of 1938. I

From left to right, mechanical engineering grads (front row) John Davies, Henry Hanson, Robert Kuphal, Robert Bredeson, William Andres, (middle row) Marvin Bennett, Ronald Pfleider, John Gerstenmaier, Clayton Corneaby, (back row) Richard Henning, Ralph Muller, Robert Manly, and mechanical engineering professor emeritus Fulton Holtby.

From left to right Ralph McMillen (School of Mines/Geology), Orville Lundstrom (School of Mines), Howard Nordquist (School of Mines), Raymond Sundquist (Metallurgical Engineering), Vernon Robinson (Metallurgical Engineering).

Civil engineering alumni. From left to right (front row) Gust Pearson, Jack Davies, Dick Ohman, Don Spielmann, (middle row) Jack Richmond, James Davidoff, department head Steven Crouch, Bill Lowe, Mark Olson, John Ellison, (back row) Ken Person, Clark Hook, Ralph McDonald, Bob Kellum, Ray Bass.

Not pictured: Lloyd English (Electrical), Robert Evans (Chemistry), John Jungbauer (Mechanical), Donald McMullen (School of Mines), Nord Onstad (Electrical), Asbjorn Severson (Mechanical).

Chemical engineering and chemistry alumni. From left to right (front row) Jesse Wright, George Piercy, Charles Carr (Chemistry), Earl Wookey, Walter James, (back row) Spencer Hellekson, Orval Alstad (Chemistry), Russell Mickelson, William Podas, Gail Libby, William Enderson.

Electrical engineering alumni and spouses. From left to right (front row) Verna Hesse, Harriet Lee, Dorothy Hanson, Ruth Prestholdt, Charles Burns, (back row) Hugo Hesse, Robert Saunders, Gordon Lee, Elizabeth Saunders, Lyle Hanson, Donald Erickson, Ogden Prestholdt, Gordon Brierly.

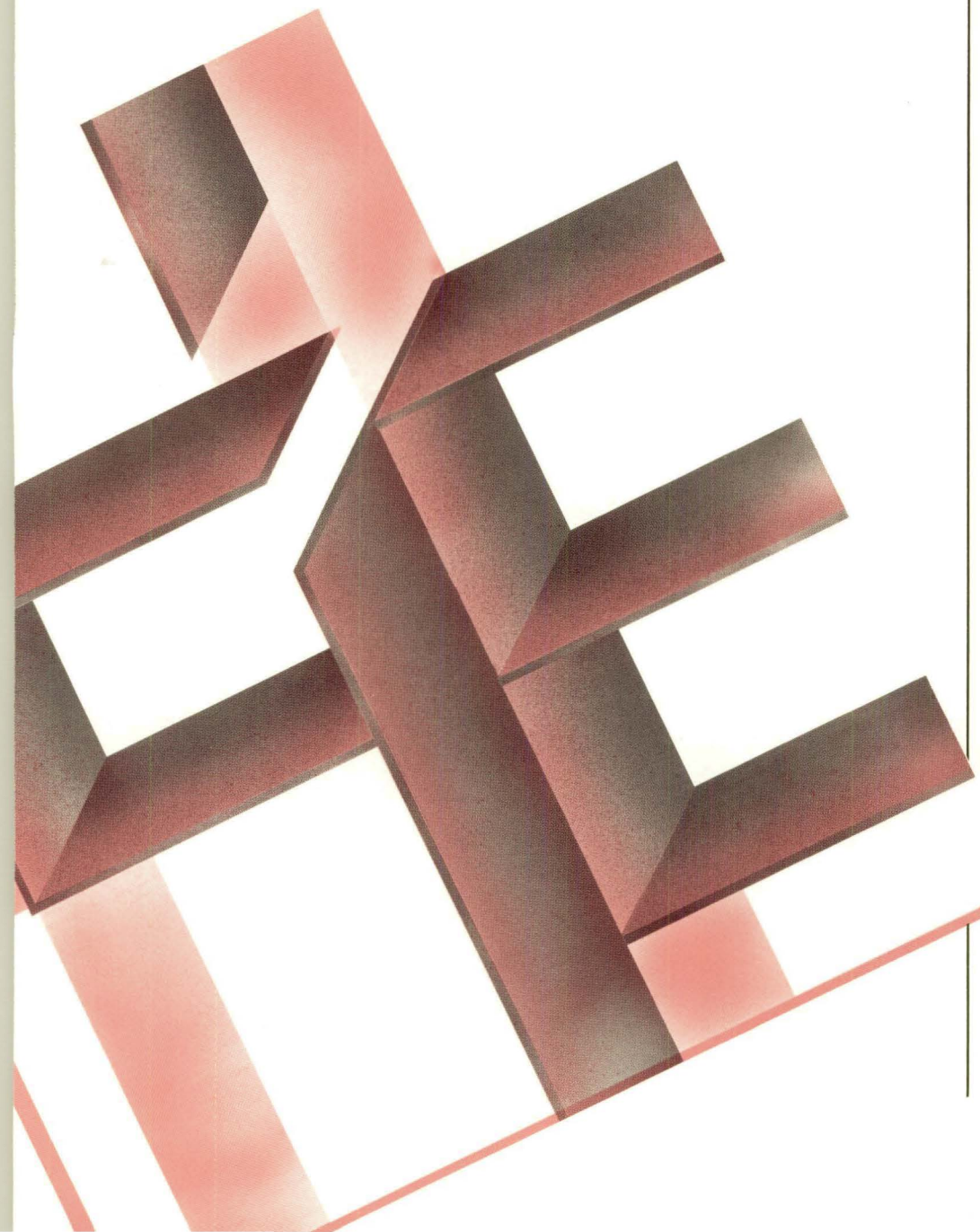
From left to right, aerospace engineering grads Harold Schmidt, James Brandt, Jacob Schmid, Paul Campbell, Lloyd Bertholf, Don Benson, Goodwin Luck.

Photos by Patrick O'Leary

A Potent Mix

Center unites top-level researchers and a hot new discipline with innovative industry partnerships

By P.J. Rader



You might recognize any one of their names from professional journals or from colleagues. You might consider them part of the University's local research scene.

Collectively, though, they now form a powerful scientific mass, officially known as the Center for Interfacial Engineering (CIE). CIE's research team features an all-star combination, including faculty members from various disciplines and industry members from the corporate world.

In August 1988, a $12 million grant from the National Science Foundation (NSF) confirmed what many already knew: CIE is leading a new way. The center faced stiff competition in receiving the money and its status as an Engineering Research Center: NSF named only four such centers nationwide in 1988. Additional industry contributions bring CIE's total five-year budget to $27 million.

"With the new resources come major challenges and responsibilities," says D. Fennell Evans, CIE's director. "We are committed to forging new partnerships with industry, providing world leadership in developing relevant educational programs, creating a major new instrument facility, and establishing interfacial engineering as a new coherent discipline. We have laid the foundation; now the really hard work begins."

CIE's research examines a field that's gaining widespread importance. Interfacial engineering "deals with the production of a myriad of microstructures, such as thin films, microporous solids, composite materials, sol-gels, and microemulsions, that are the building blocks as well as the final products of interfacial systems," explains Evans.

He lists numerous applications: for microelectronic fabrication; for coating of photographic, optical and magnetic films; for designing selective membranes for low-energy separations; and for solving complex colloidal surface problems associated with developing alternative energy sources and controlling environmental pollutants.

Interfacial engineers study the molecular interactions that occur at the boundary between two materials. The discipline's roots lie in engineering, chemistry, and physics. CIE's research programs cover five areas: thin films/vapor processing, coating process fundamentals, polymer microstructures, self-assembly processes, and characterization and behavior of interfaces.

CIE's education efforts extend to many fronts. "The center is part of the University, and the basic mission of the University is education," says Edward Cussler, associate director of education for CIE. "The center must contribute to students' education."

To do so, CIE will start a new minor program in interfacial engineering and develop curricula for short courses and workshops. Specifically, faculty are designing six new courses for seniors and graduate students on topics such as microelectronics, membranes, and coatings. These courses will serve as the basis for five textbooks, problems, and syllabi, which can be used at other universities. "This export of educational ideas is a complement to the transfer of technology," says Cussler.

A technology transfer program—directed by Robert Gee, a retired industry executive—also explores new territory. Rather than following the time-honored method of sponsoring seminars and conferences for fellow scientists working in industry (although the center does host such events), CIE designed a program that goes far beyond a one-day or even one-week event. It provides for lengthy—three months to a year—"fellowships" for industry scientists that allow University and industry researchers to work together, sharing information and inspiration over a significant period of time.

CIE's research team features an all-star combination, including faculty members from various disciplines and industry members from the corporate world.

"It's a very different idea of technology transfer," says Elizabeth Starbuck, who—as associate director of technology transfer at CIE—spearheads the residency program that brings researchers to the center. "It's not passive. The two cultures [academic and business] are quite different so we are, in effect, setting up a bridge to allow communication between the two. We talked to one company recently that said they would work only with a university that had a group to facilitate exchange, and that's why they came to us."

Currently, 24 companies support center efforts. For continued success, Starbuck says, the center must view the concept of technology transfer as two-way. "Companies are no longer just sending us money and saying, 'Do something with it,' " she explains. "They are sending their own people here to work on mutually interesting problems. It's a major investment on their part, much more significant than sending money. It's not just a corporate commitment, it's a personal commitment as well. And the fact that they're making it shows they understand what they'll be getting back in return."

Art Coury, director of ventures technology at Medtronic, a local medical high-technology firm, recently spent three months as an industrial fellow at the center and agrees wholeheartedly with Starbuck. "Medtronic wanted to be a charter member of the center," he says. "We really believe in the concept."

The fellowship offered Coury the chance not only to conduct research relevant to his projects at Medtronic, but also to learn from working with CIE's research group. "From that interaction, other research projects have started at my company."

Coury says some companies and groups might resist the idea of collaborative work (the center does not encourage proprietary work). Some companies might also worry about losing a valuable employee for any extended length of time. "But while some resist it, others will encourage it, and they will benefit," he says.

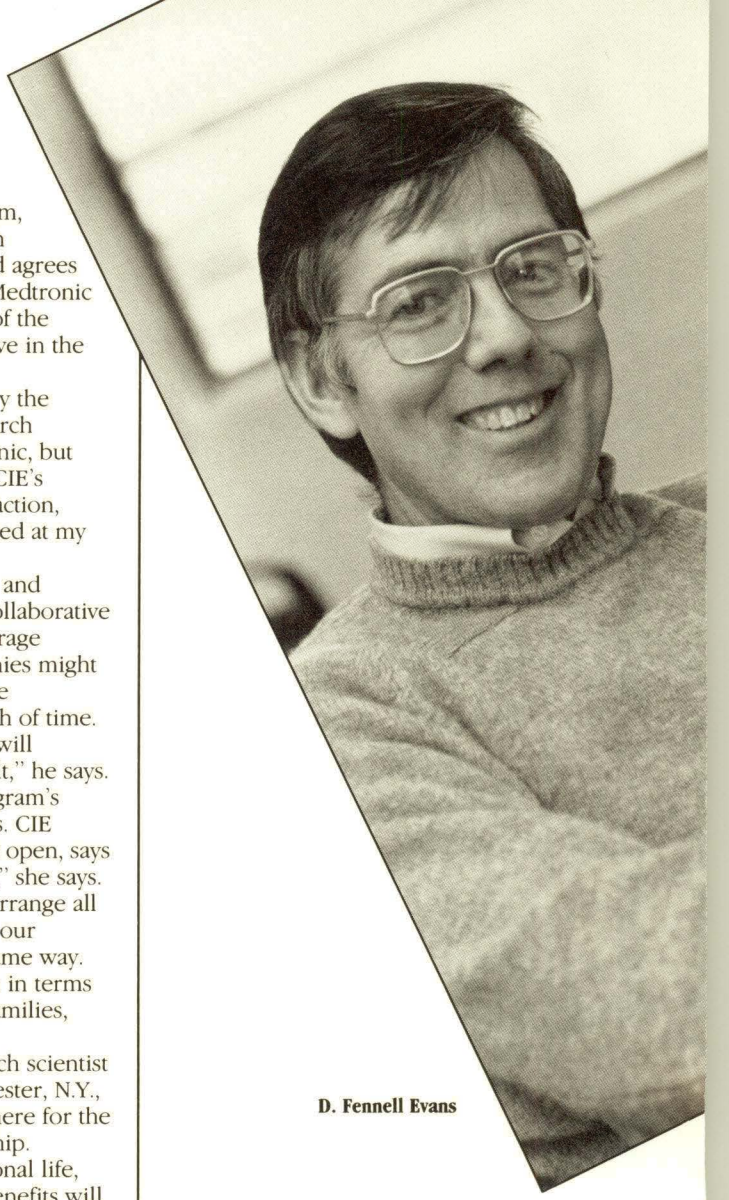
Coury compliments the program's flexible structuring of fellowships. CIE deliberately kept fellows' options open, says Starbuck. "This is an experiment," she says. "We're very open about how to arrange all this, and I don't think any two of our fellows are doing it exactly the same way. Each one has a different situation in terms of their research projects, their families, where they live."

Simon Fung, a senior research scientist with Eastman Kodak Co. in Rochester, N.Y., and his family decided to move here for the duration of his year-long fellowship. Despite the upheaval in his personal life, Fung believes the professional benefits will be significant.

"It's definitely a positive thing for me professionally," he says. "I'm being exposed to new concepts, computational techniques, ideas." In this situation, you can pursue ideas you might not have time for in your job, he says. "It's experimental and analytical work that may or may not solve a particular problem. The interaction between myself and the professors and graduate students shows me that there are many other fields of inquiry. And that awareness may lead to my ability to look at specific problems at Kodak and come up with new types of solutions."

That's the kind of comment that would cause Klavs Jensen, chemical engineering and materials science professor and the center's program leader for thin films/vapor processing, to applaud. "We envisioned that some people who might come in [as fellows] would probably have specific goals in mind, but we hoped we might also provide deeper insight into their problems in general. We want them to participate actively in the research here, not just sit back and watch.

"We were eager to have these industrial fellows," says Jensen, who helped



D. Fennell Evans

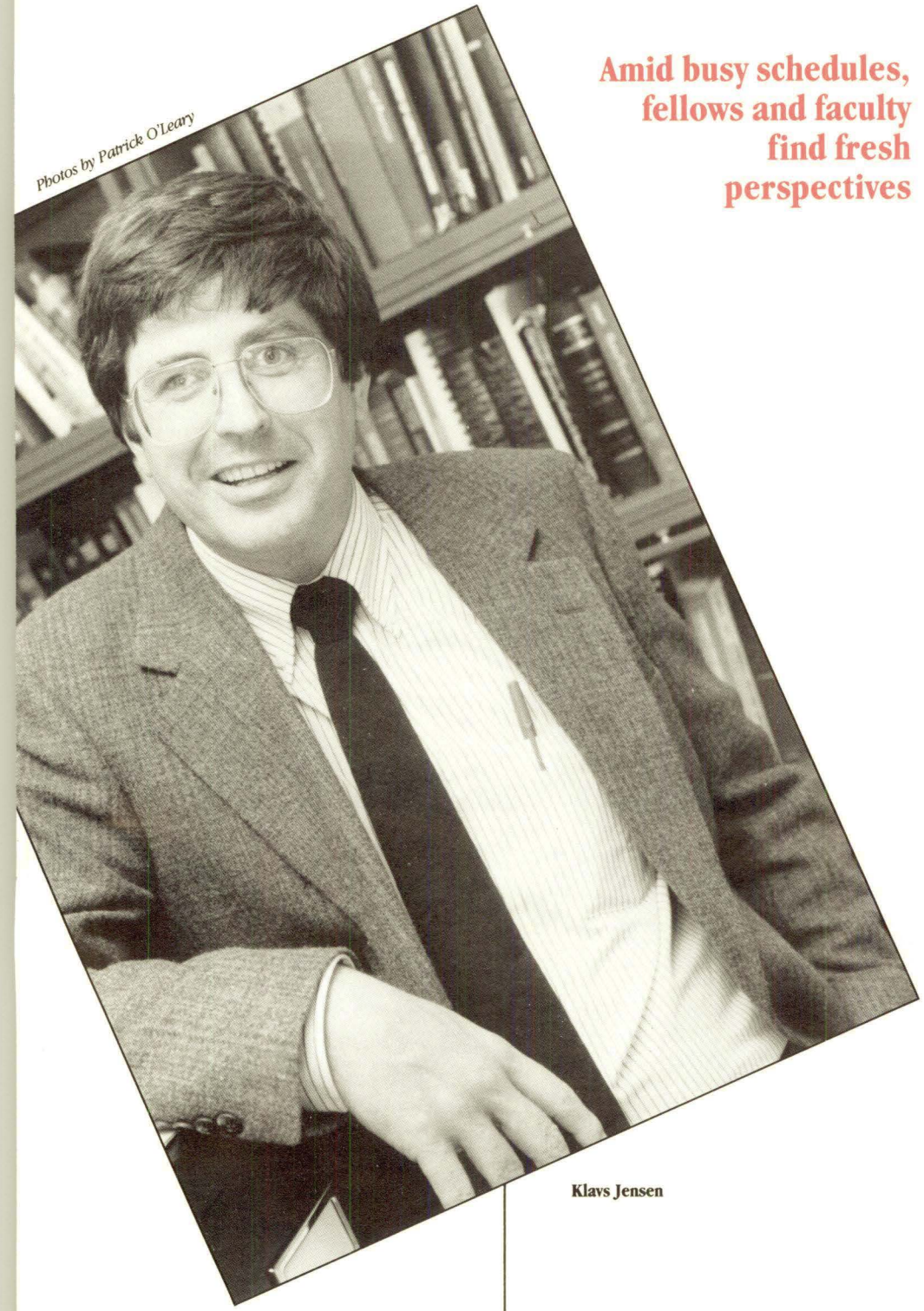
write the proposal for NSF funding. "It was obvious that the technology needed to make American industry competitive was to be had, some of it at this University, but it was going in the wrong direction. The Japanese were sending people over here to study at American universities. And they were going back with all kinds of ideas and approaches; but American companies were not doing the same thing. We wanted to create a place where there could be an efficient interface with our own industries. And we wanted it to be beneficial both to us and to them."

While the potential benefits to industry include expanded knowledge and insight toward solving specific product-related problems, the benefits to the University include a wider perspective not only for the researchers directly connected to the center, but for their colleagues and graduate and undergraduate students. Jensen sees it as a catalyst for more cooperation within the University itself. In addition, the center may expand its concept and provide incentives to attract faculty from other institutions.

"The creation of the Center for Interfacial Engineering is the best-

Amid busy schedules, fellows and faculty find fresh perspectives

Photos by Patrick O'Leary



Klavs Jensen

One busy guy, Willie Hendrickson juggles a heavy load: his position as senior research specialist in charge of the fine particles group at 3M, his involvement as an industrial fellow at the Center for Interfacial Engineering (CIE), his job running a 40-acre farm just across the state line in Wisconsin, his commitment to his family, and his participation in intramural sports.

Hendrickson laughs as he lists all of the above. Busy people need a sense of humor. Busy people often improvise, too. Hendrickson spends three workdays every week at 3M and two days a week at the center. Everything else gets "squeezed in."

"It's a difficult situation going on sabbatical," he says with a fine sense of understatement. "You wonder, what will be there [at my company] when I get back? I didn't want to lose my people—maybe have them assigned to another group or something. So you want to keep your hand in there. But you want to do a good job here; otherwise, why come?"

By all accounts, Hendrickson takes his fellowship seriously. Soon after his arrival, he and his colleagues figured out a way to use scanning tunneling microscopy (STM) to image a new class of conducting polymer at the molecular level. They discovered helix-like structures that explain some of the unusual properties of these high-tech materials. Within a month of his arrival, he and his co-workers were preparing a paper that will be published in the *Journal of Physical Chemistry* this winter.

"STM allows you to see individual atoms," Hendrickson says excitedly. "It's very useful in looking at different types of surfaces that you can't characterize any other way. This is of interest to both 3M and the University. We have all sorts of ideas about how it might be applied, but then again, it might turn out that none of them work."

Hendrickson's hectic workweek does offer him the advantage of providing immediate transfer and communication between his 3M work and his work at the center. "We have had some major programs going on right now at 3M based on stuff that's going on here at the center. It's given us some very interesting new directions. I wouldn't want to just come in here as an observer. I think it's important to be directly involved because it commits me to the project here in a way that just reading reports and listening to presentations wouldn't."

He sees other advantages to the technology transfer program, too. "Not only do I get to do this work and take it back and forth between here and 3M, I get to work with all these grad students and check them out. It's great for recruiting later on.

developed response of the Institute of Technology (IT) to the demand, by our society, to significantly increase the effectiveness of our research activities on the competitiveness of our industrial enterprise," says Ettore Infante, IT dean.

"Through the center, we leverage outstanding intellectual activities with appropriate contacts with industry, to the mutual benefit of both partners; and this interaction deeply enriches the educational activities of the center and the University. IT looks to the center as a leader in further developing education, research, and service to our increasingly technologically dependent society." **I**

P.J. Rader is a free-lance writer who lives in the Twin Cities.

"The bottom line is even if all the stuff we've been looking at here doesn't work, it has definitely not been a waste of time," Hendrickson says. "It's produced communication and built many contacts. And that's very important. The closer the contacts, the more productive we all can be. To me, what's so impressive about this program is the commitment by both the University and the industry fellows to get something done, to make things happen."

Blending the work of professors—who tend to investigate fundamental, generic, sometimes even esoteric questions—with the needs of industry folks—who tend to want immediate solutions to real problems—may seem tricky, at best.

Chemical engineering and materials science professor Matthew V. Tirrell acknowledges the difference between the fellows and professors. "We want to discover principles, and they want to solve problems." Fortunately, he says, those two goals can mesh very nicely.

"We will meet our academic goals, but in the process we want to let the industrial fellows absorb what we are doing so that they can make use of it within the context of their own industrial applications," says Tirrell, program leader for CIE's polymer microstructures group.

"We have accepted the fellows as colleagues. They are free to absorb from us and to offer suggestions for change," he says. "And it works the other way as well."

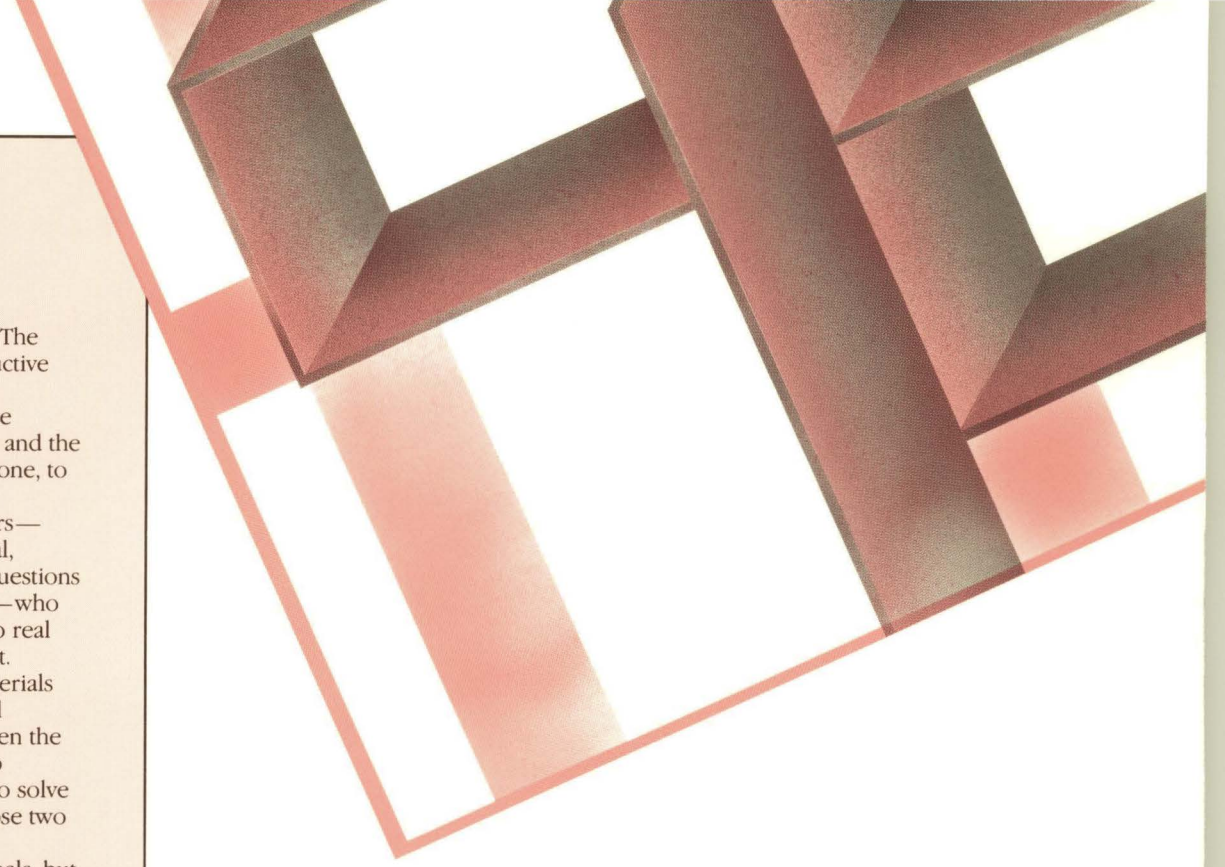
Tirrell enjoys seeing researchers from diverse backgrounds working together on mutual projects. "There are many different products that don't seem to have anything in common—say, photographic film and photoelectronics—but are similar in the sense that both are based on interfacial engineering.

"Normally these people wouldn't run into each other. But they might have something to say to each other; they might be able to offer new insights into each others' problems. And that interaction can take place here."

CIE's ability to unite common efforts creates new ways for faculty to conduct their business, too.

"Professors are sitting down and talking to each other about their research in terms of how it might connect with the center," says Tirrell. "That's relatively rare—to sit down together at the beginning of a project and figure out how your work is going to intersect with someone else's work. It's very positive." I

By P.J. Rader



Interactions at interfaces: an interdisciplinary study

CIE research projects involve some interesting interactions. For example, Stan Hager of Union Carbide spent six weeks at CIE working with professor Christopher Macosko. Using video microscopy, they studied the rates and mechanisms of mixing foam chemicals and reaction intermediates. D. Fennell Evans, center director, designed the equipment, and Macosko and graduate student Steve Machuga developed the technique. This technique allows for the measurement of the interfacial mixing that occurs when reaction-injection-molding (RIM) chemicals come in contact. This video investigative procedure helps explain why very small particle dispersions form during impingement mixing and helps identify which chemical factors are responsible. Hager extended this technique's capability to include visual study of the chemical generation of foams. I

CIE research areas

Thin films/vapor processing
molecular beam epitaxy, chemical vapor deposition, organometallic precursors, high-temperature plasma

Coating process fundamentals
rheology and curability of flow coatings, multilayer films, tapes, and discs

Polymer microstructures
polymer interfaces and fundamentals of adhesion, membranes, reactive polymer processing

Self-assembly processes
spontaneous formation of ultra-thin films (langmuir blodgett, bilayers) and interwoven bicontinuous systems

Characterization and behavior
analysis of chemical, structural, physical behavior of interfaces

CIE investigators

Frank Bates
Howard L. Brockman
Philip Cohen
Steven Crouch
Edward Cussler
H. Ted Davis
D. Fennell Evans
Alfonso Franciosi
William Gerberich
Wayne Gladfelter
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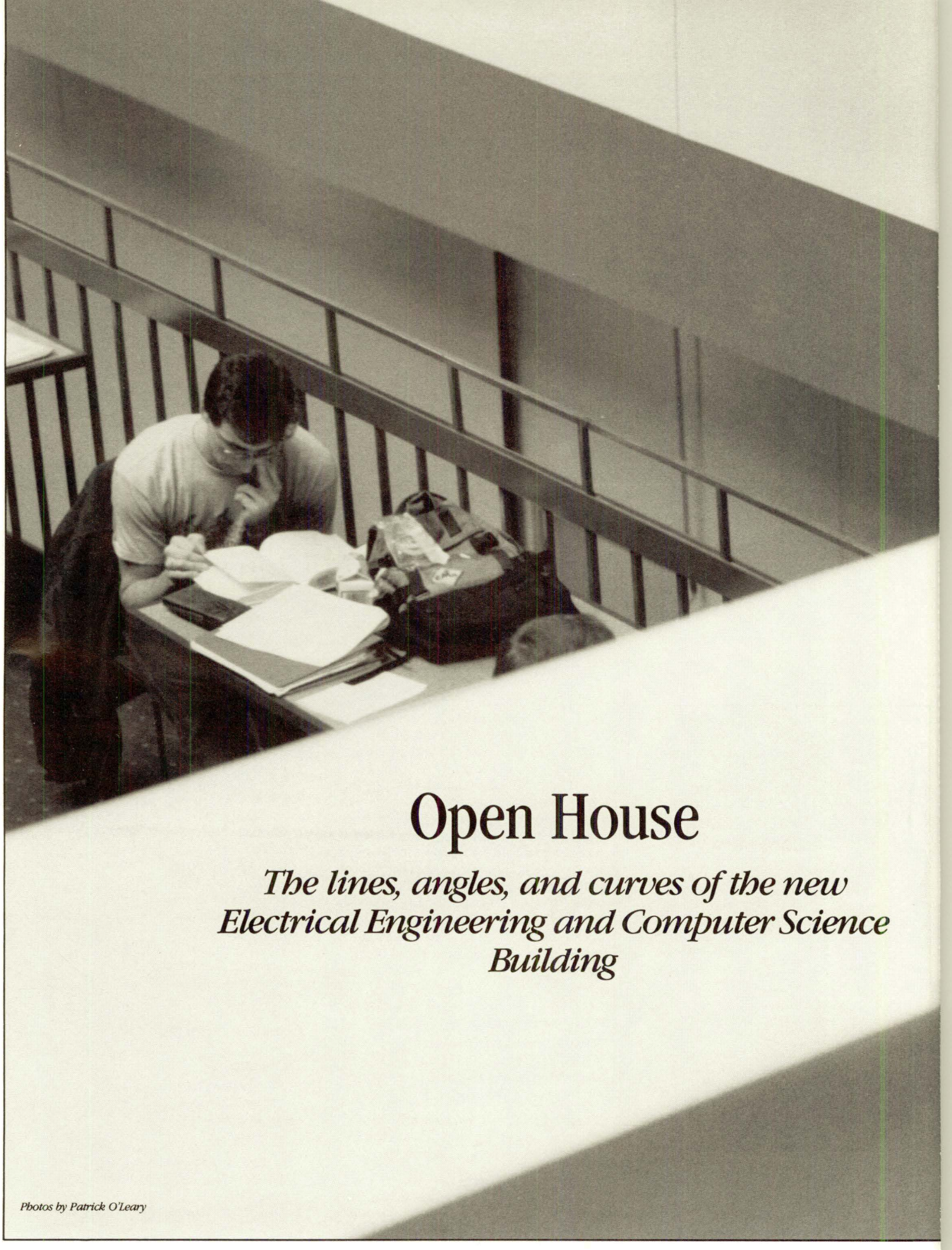
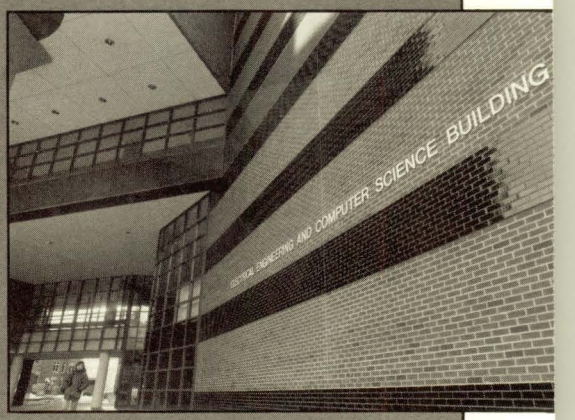
Robert Gee, director of technology transfer
Elizabeth Starbuck, associate director of technology transfer



Open House

The lines, angles, and curves of the new Electrical Engineering and Computer Science Building

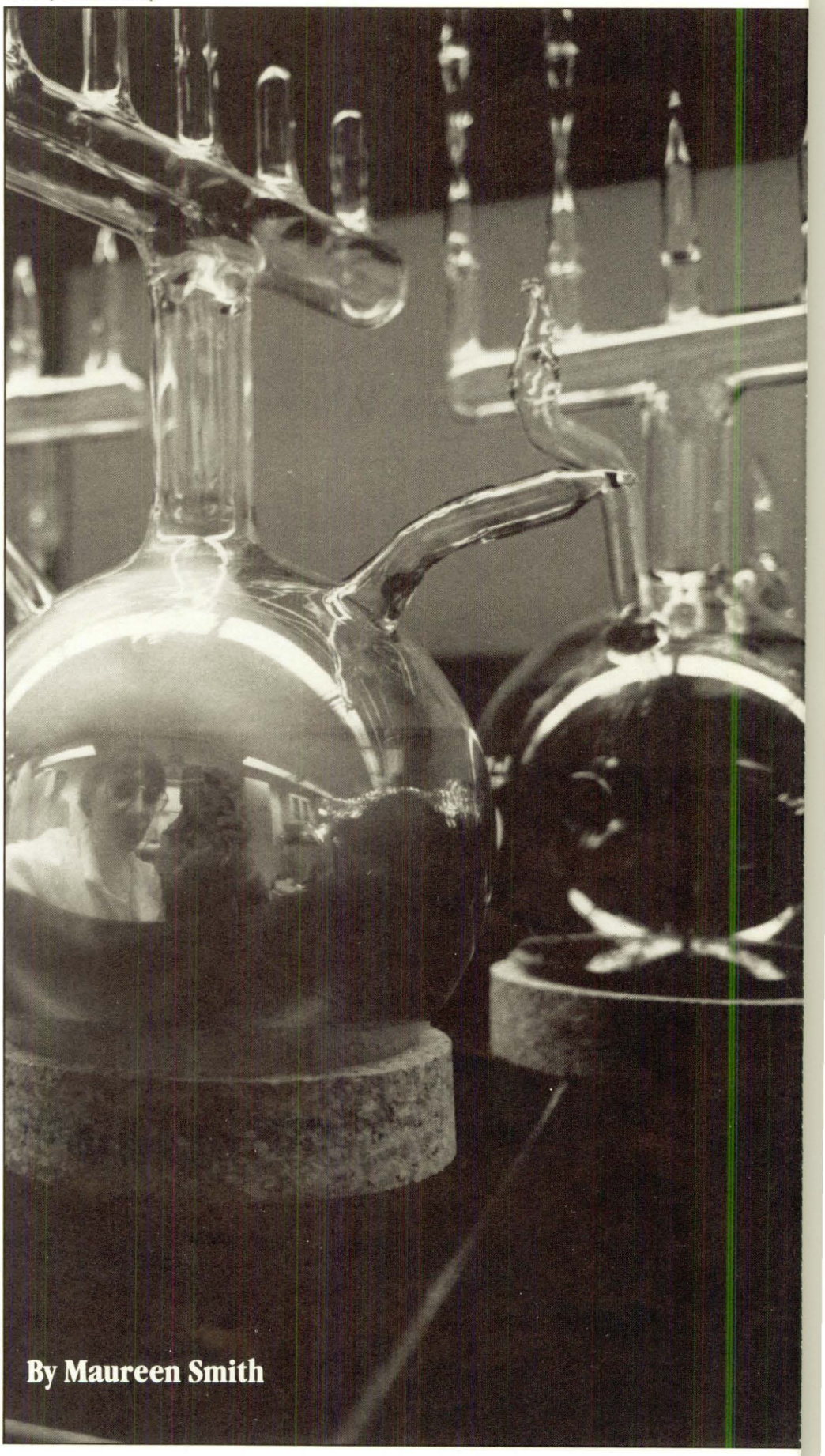
Photos by Patrick O'Leary


ELECTRICAL ENGINEERING AND COMPUTER SCIENCE BUILDING

Catalysts for Change

Chemistry department finds new formulas for resolving conflict

Photo by Patrick O'Leary



By Maureen Smith

Back in the early 1970s the chemistry department turned down Shyamala Rajender for a faculty position and, right or wrong, was singled out for its record of not hiring women. Last year new notoriety came to the department with reports of continuing troubles and one shocking incident.

Now that same chemistry department may be a model for how to work through gender issues and other conflicts.

A year ago in January, when a *Minnesota Daily* headline read "hostility reigns in chemistry department," the department was already at work solving its problems, with the help of two organizational consultants.

"We got people talking together who hadn't been talking. We dealt with all the issues, including the very difficult ones," says department chair Louis Pignolet. "Given where we were a year ago, I think it's incredible."

"We have a professional, open, and productive environment, which we haven't had for a while," says Margaret Etter, one of four women on the chemistry faculty. "There is almost bemusement. We can't really believe we did this."

Roots of the trouble

Understanding recent events requires looking back at least to 1980. That year, the University reached an out-of-court settlement with Shyamala Rajender, who filed a charge of discrimination in 1973 when she was not granted a tenure-track position in chemistry. As part of the settlement, the University signed a consent decree that set affirmative action goals and outlined hiring procedures.

In chemistry, emotions about the case still run deep. "My leftover feeling from that time is that the University did a very poor job of communicating with the chemistry department what the stakes were and what was going on. We were never given an opportunity to respond to any of the allegations," says Harold Swofford, who was department chair right after the Rajender ruling and who is now regarded by the three tenured women as an ally.

The consent decree mandated that at least two of the next five vacancies in the department be filled with women, but chemistry had already offered four positions to four men. In the end, the department hired two of the men in tenure-track positions. The other two, George Barany and Paul Barbara, were given temporary faculty appointments while the department searched for two women.

Marian Stankovich was the first woman hired under the consent decree, followed a few months later by Essie Kariv-Miller. Whatever their strengths as scientists, they started with two strikes against them: They had been forced on the department, and their colleagues did not believe they were the best-qualified applicants for the jobs.

Did the situation put extra pressure on the women? "There is no doubt in my mind," Stankovich says. She wasn't sure she wanted to take the job under the circumstances, she says, but her concerns were eased during the interviews. "They asked me a lot of questions, and it looked like they were trying to determine if I had a high probability of success. They weren't just dragging someone in off the street. I was excited about it."

Photo by Tom Foley

Doreen Leopold

Problems began for Stankovich about a year after she arrived, when she had difficulty finding graduate students to work with her, even though she had grant support to offer. "I felt after that I somehow lost the support of my colleagues," she says. Whether her male colleagues were as helpful as they could have been in encouraging students to work with her is one of many subjects on which opinions differ.

Clearly, the mandated hiring of two women was also hard on the two men who were caught in the middle. "I was one of the hostages," Barany says. "That was a real soul-searching situation for me. My parents are both scientists, and I have a lot of natural empathy for what a woman faces to succeed in science. But as far as I was concerned, it came down to a question of good faith. I'd made active preparations to come, I'd cut off other offers. I was looking forward with great enthusiasm to starting my career here."

Barany accepted the job in January for the following fall. The first he heard of any problem was in mid-April from a newspaper reporter. "Nobody had even mentioned litigation. It was a total shock," he says. Eventually, the temporary agreement was worked out.

The two "hostages," Barany and Barbara, are now tenured faculty members. Kariv-Miller, who had taught at Tel Aviv University and earned tenure there, came with tenure and is now a full professor after a negative vote of the faculty was overturned. The department voted down tenure for Stankovich, but that decision was also overturned. For these four individuals, the stories have happy endings, but scars remain.

Peggy Etter, now in her fifth year, and Doreen Leopold, hired two years ago, are the second generation of chemistry women. They were hired under the Rajender umbrella but not under a specific mandate, and their male colleagues say they were hired because they were the best possible choices for their jobs.

Etter knows some of her colleagues are still bitter about the Rajender decree, but she sees it differently. "I believe I wouldn't be here today if that hadn't happened," she says.

Shock waves

The year before last, with the arrival of Leopold, chemistry had some numbers to brag about, probably more women on its faculty than at any other major chemistry department in the country. The Rajender memories were starting to fade. It could have been a year of healing and building.

But it wasn't. The year brought one crisis after another. Even now, not all of the stories can be told.

In personality, temperament, and perspective, the four chemistry women are quite different from each other. For both the women and the men, it has been hard to sort out gender problems from personality conflicts.

Kariv-Miller, the most aggressive of the four women, has also come under the most attack. "I'm used to competition. I know how to use my elbows," she says. "The competition in the environment I grew up in is much harsher than here." A far lower percentage of faculty members in Israel ever get tenure, she says.

"I'm used to competition, but what I encountered here is of a totally different nature," she says. The most talked-about incident, which sent shock waves through the campus when the *Daily* told the story last January, happened the previous June, when Kariv-Miller found a pile of feces on her desk.

Who put it there? Off the record, chemistry faculty offer two main hypotheses, neither involving a current faculty member. But in Kariv-Miller's mind,

the problem is that the department never made a serious effort to find out. "Something terrible happens, and nothing is done."

"To tell you the truth, that was not the worst thing," she says. "It's picturesque, and you can say it in a sentence and people understand what happened. If I explained what happened to my promotion, it would take hours."

The fight over Kariv-Miller's promotion happened in that same year of crisis. In a close vote, the faculty turned down her promotion; but Pignolet supported Kariv-Miller, and IT's promotion and tenure committee overturned the decision.

A complicating factor in the Kariv-Miller case is that her husband, Larry Miller, was department chair for three years. He was on the faculty but was not chair at the time she was hired. "We've managed to work well in the same department," she says. "I did feel I would not want to come up for promotion when he was chair. I waited a year. I was asking for a promotion to full professor, so there was no time limit."

Last year, when the department began meeting with consultants, Kariv-Miller didn't think anyone would show up for the meetings. "They did," she says. "This is the thing that gave me hope. This majority was willing to put in the time and talk."

Gender concerns

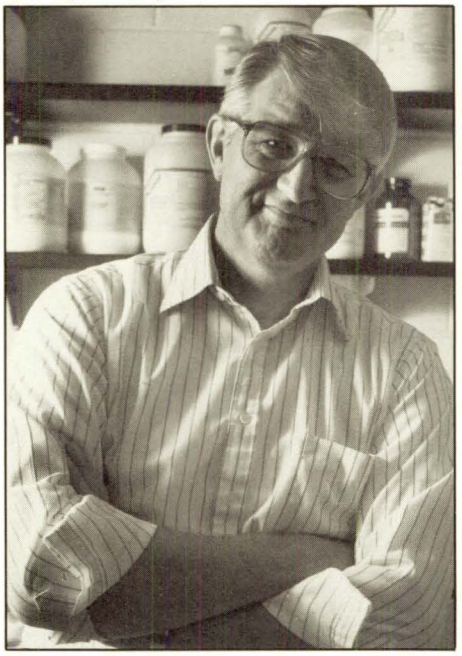
For Marian Stankovich, it took a while to decide that the problems she faced related to gender. Maybe the fact that her work was at the intersection of biology and analytical chemistry made it hard for her colleagues to judge, or maybe it was her quiet personality.

When she and Kariv-Miller were voted down for promotions at the same time, Stankovich decided the pattern was clear. "Essie was criticized for being too aggressive, and I was criticized for not being aggressive enough," she says.

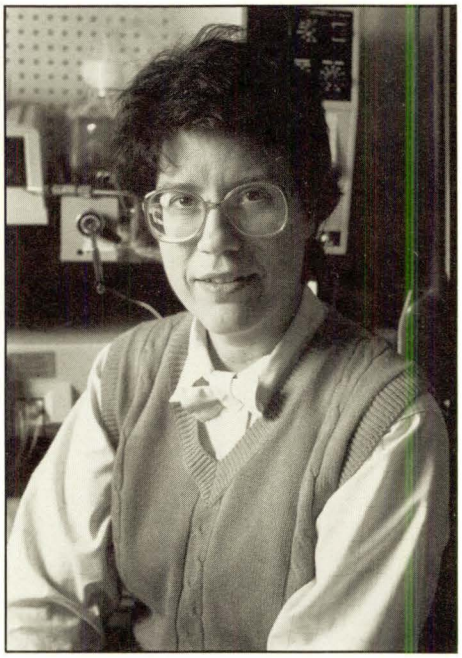
"The thing that saved me was that the files are open," she says. When she looked at the documents, a statement that said she did not understand the conclusions of her own research stood out to her as blatantly ridiculous. In a seminar presentation, she says, she left a question at the end because she wanted her graduate student "to have the fun of talking about this great discovery we had made." In refuting the negative tenure report, she presented evidence that her Ph.D. mentor had encouraged her to publish her findings and that she did indeed know what she was doing.

Whether the negative vote on Stankovich's tenure was discriminatory is still disputed in the faculty. "What's important is that she's here as a tenured member of the faculty, and we need to do all we can to help her succeed," Pignolet says.

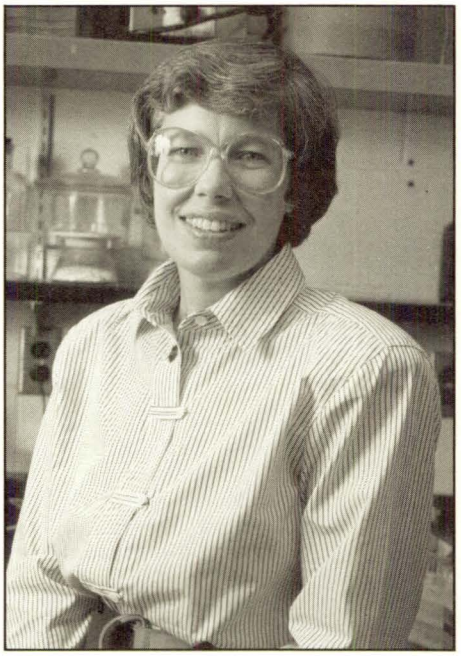
Photos by Tom Foley



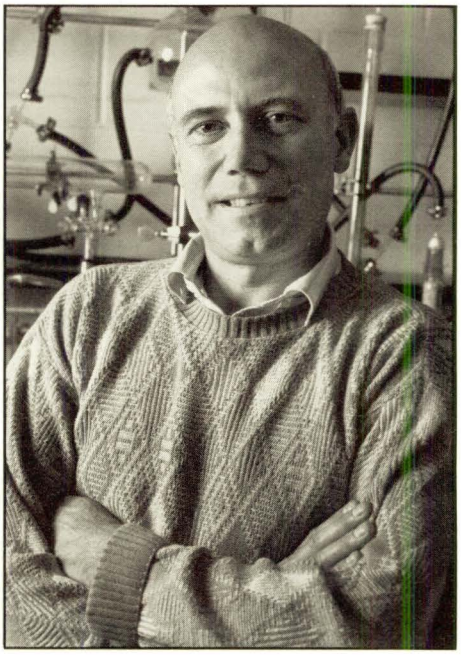
Harold Swofford



Marian Stankovich



Margaret Etter



Louis Pignolet

After the tide turned for Stankovich and she won her hard fight for tenure, she had a choice. She had an offer from the University of Iowa and could have gone there with tenure. But she was encouraged enough by what was happening at Minnesota that she decided to stay. "That's made all the difference for me," she says. "I didn't have to stay, but I chose to stay."

Although Peggy Etter was the third chemistry woman hired, she has the longest history with the department. A graduate student when Rajender was a temporary faculty member, she applied for a job when she completed her Ph.D. but was not even considered.

Etter took a job at 3M and worked in the central research labs for seven years. "As much as I liked it there, I belong here," she says. "I should have been a university professor from day one."

In 1980, when the department advertised for two women, Etter applied again. "I don't want to go into any details, but I had some contacts at that time that were exceedingly unpleasant. I was

trivialized, and it was just a dreadful experience," she says. "I did not join the [Rajender] lawsuit, although I considered it."

When Etter was finally hired in 1984, she was starting from behind. "I missed 10 years of my career, and those years are very important," she says.

"I had done some publishing, but I had no idea at all about the grant process. I was starting at ground zero, maybe even less than ground zero, because my resume looked weird. I did not look like a star on paper, and I was competing with people who were. Because of my age I couldn't apply for the starter grants."

In just four years, Etter has made up a lot of ground. "My research has gone well, I have students, I have international recognition," she says. Last year she applied for early tenure, and the decision went smoothly and overwhelmingly in her favor.

A dissenting voice

The newest woman on the faculty, Doreen Leopold has had quite a different experience from the first three, and she has taken an opposite stand.

"I don't think of myself as a woman chemist," she says. "If you'd ask me what kind of chemist I am, I'd say a physical chemist. If you'd ask me what's different about me, I might say it's that I talk fast. Everyone's unique. I have a few quirks in my character, and people respond to them. I don't think it's because I'm a woman. Sure, there are people who will act as if you're stupid. But that happens to everybody all the time.

"I don't want to sound as if I'm invalidating another woman's experience," Leopold says. "I'm not implying that anything the other women have observed is wrong for them. And, of course, that works both ways."

In just two years at the University, Leopold has collected some impressive credentials. She won a McKnight-Land Grant Professorship and a Presidential Young Investigator award. But Leopold doesn't think she has it made. This is her year for building a machine for her research, and she knows she needs to produce results.

More than seeing herself as a woman scientist, Leopold is very much aware of being an assistant professor, and what has struck her at Minnesota has been the welcome. "They really treat you as if you're going to stay. You're part of the community.

"This department is very supportive. They nominate you for awards, they give you a reduced teaching load, they encourage the graduate students to work with new faculty. This place gets such bad press, and then you come here and people are so nice."

Working through conflict

In the last two years, Pignolet learned to deal with conflict by facing it head on.

"You like to avoid conflict, but it's a mistake to avoid it," he says. "As hard as it is, conflict is probably good in the long run. It forces things to change. The consultants we hired [Jerilyn Fosdick and Richard Hunecke] were experts at using conflict to make things go in a positive way."

Like most new department chairs, Pignolet says that when he took over two years ago he had no training as an administrator and the University offered him no help. "The University needs to give more guidance to people who become administrators," he says. "It was very hard in the beginning. A lot of things came up, and people got very agitated and worried on all sides. It was difficult to know what to do.

"It became clear to me that we had to help the women in the department. The consultants made the big difference. I'd like to think my views were always positive, but my ability to handle problems has changed. Now as soon as I detect any difficulty, I will sit down with the people involved."

A handful of men were causing most of the problems for women, Kariv-Miller says. The battle was to show the men in the middle that the problems were real.

"The majority of the men are, quote, neutral. But by being neutral they perpetuate the situation," she says. When women are harassed, she says, she is sure most men don't like to see it. "They don't identify with it. They just want it to disappear. You don't close your eyes and it's gone."

"Certainly this department is populated by males, and discrimination is extremely subtle," Swofford says. "A lot of the males who exhibited behavior that was interpreted as discriminatory, I don't believe that they were aware of it. We need to educate people. If you talk to the males, they will say they have no intention of discriminating. If you talk to the females who were on the receiving end of the comments, they will feel it was discrimination."

"So many of the men think we're accusing them of intentionally damaging women's careers," Etter says. "As long as that's their point of view, they will always say there is no problem. Very few people wake up in the morning and say, 'What can I do to keep Susie Q from becoming a chemist?'

"People need to realize that we're not calling them criminals. We'd like them to say 'Tell me what you're talking about. I don't understand.' instead of 'Who, me?' That's the tough step," Etter says.

Women's issues were not the only topic when the chemistry faculty met last year in groups of six. Guided by the consultants, the faculty drew up a reorganization plan for the department.

As could be predicted, not everyone is cheering. "I don't think the outcome of a year's meetings has been necessarily good. I can't jump up and down and be enthusiastic," says regents' professor Paul Gassman.

"The concept was excellent," Gassman says of the decision to bring in consultants and meet in small groups. "I strongly supported it. What I would have liked to see is that these discussions would have broken down the lines of antagonism. I think in a few instances they may have. In many instances, if anything, they hardened them."

In a department with a history of competition and disagreement, or in any department of highly intelligent and individualistic faculty, unanimous support for a reorganization plan could not be expected, Swofford says.

"What we have now is that a significant fraction of the faculty are willing to work with what the collective opinion is. That's really a monstrous step forward for this department. We're headed in the right direction. The right people have their shoulders to the wheel and are going to push."

On one point, Swofford and Gassman fully agree. Even with all its troubles, chemistry is a much stronger department than it was 10 or 12 years ago.

"If you talk to people around the country, you will hear good things about Minnesota," Gassman says. "Chemistry has a tremendous rumor mill nationally. People are aware of the problems we've had. In spite of that, most people would say that we have been a very significantly improved department over the last dozen years."

"If you look at the progress we've made in grants, in individual publications, in the growth of our graduate programs, it's been phenomenal," he says. "There is not another department in IT that has made anywhere near the same progress in improving its stature on a real basis.

"We've come a long way. This is why it's so frustrating to hear the department bad-mouthed almost constantly around the University," Gassman says. "We have spent 10 years under a microscope of far greater magnitude than any other department in this University."

"I am aware that this is not the only department on campus with problems," Swofford says. "For a long time we were pointed at. Now the University may well turn to this department and point to it as a showpiece of how these very difficult matters can be handled. I look forward to that." **I**

Maureen Smith, who works for University Relations, is editor of Update, *a publication for faculty and staff.*

FACULTY

Cosmic rays: "the ultimate candy store"

Careening through outer space at relativistic speeds and packing as many as 10^{11} billion electron volts each, cosmic rays were hard to ignore even in the early decades of this century. But until 1948 nobody understood their composition before they hit the atmosphere.

That year, a team of University researchers—including graduate student Phyllis Freier and professor Ed Ney—made one ultimate cosmic discovery. The findings inaugurated a new era of scientific inquiry that has hardly flagged since.

In August 1988, a University symposium, "Cosmic Abundances of Matter," celebrated the 40th anniversary of the characterization of primary cosmic rays with a salute to Freier, now a physics professor, and Ney, now a regents' professor of astronomy. Top scientists from around the country and Europe converged to discuss the nature of matter in the universe and the current state of cosmic ray research.

In 1948, the infant stage of cosmic ray research required creativity, expertise, and a reliable car, as Ney and fellow professors Frank Oppenheimer and Ed Lofgren quickly realized.

Using huge balloons built by General Mills and launched at a naval air station near the Twin Cities, Ney, Oppenheimer, and Lofgren had repeatedly sent sensitive detecting equipment over 90,000 feet into the air. Since the balloons couldn't be reliably retrieved (one of them went through a roof in Iowa at 400 mph), the sensing equipment was designed to disengage at a given time and parachute to the ground. Pilots from the air base would radio the balloon's position to Ney and Oppenheimer, who would follow in Oppenheimer's beat-up Chrysler to the site of the airdrop.

The detectors, which consisted of special films and spheres of gas called cloud chambers, recorded the trails left by the electrically charged particles passing through them. By plotting the exact size and direction of these trails, Ney, Freier, and their colleagues could identify some of the particles that had left them.

On April 25, 1948, Freier found the first incontrovertible evidence that cosmic rays contain nuclei of atoms as heavy as iron. Since the heavier components of cosmic rays such as nuclei and other clusters invariably break up when they enter the atmosphere, they had never before been detected, and were rarely suspected of existing at all.

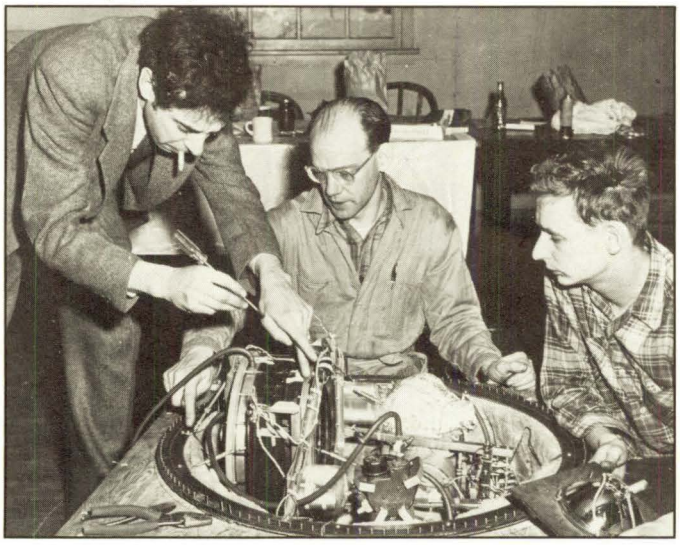
There was no quitting now. The group's subsequent balloon experiments revealed a universe of components, including many high-energy subatomic particles and nuclei of other elements. We now know that the nuclei of all naturally occurring elements exist in cosmic rays.

"Just before and after World War II, the study of cosmic rays presented physicists with the ultimate candy store," says Ney. The diverse population of positrons, muons, pions, and other high-energy particles hurtling through the atmosphere offered raw materials for the study of nuclear reactions and quantum mechanics.

Cosmic ray research continues to influence both theoretical and experimental physics in the 1980s. Although balloons haven't been entirely displaced, space travel and satellites now "collect" most cosmic information for researchers. Efforts have recently shifted to identifying the origins of cosmic rays and the source of their sometimes unbelievable energy. Freier, who is still excited by the field 40 years later, hopes to be involved in the discovery. And although Ney has turned his interests elsewhere, he plans to be around in another 40 years to see how it all comes out. I

By Deane Morrison and Rabun Taylor

Photo courtesy of Ed Ney



A 1948 photo shows (left to right) Frank Oppenheimer, Ed Lofgren, and Ed Ney

Photo by Tom Foley

Phyllis Freier and Ed Ney, cosmic ray trailblazers

Agricultural Engineering
Professor *Harold Cloud* retired in October after 38 years with the University. Professor emeritus *Roger Machmeier* received the Exemplary Duty Award from the Minnesota Association of County Planning and Zoning Administrators for his work on on-site sewage treatment systems.

Charles Babbage Institute
Arthur L. Norberg, associate professor and director of CBI, and *William Aspray,* CBI's associate director, received funding for a two-year research project on the history and influence of the Information Science and Technology Office (ISTO) of the U.S. Defense Advanced Research Projects Agency (DARPA). The project, sponsored by DARPA/ISTO and assisted by NASA-Ames and the University of Southern California's Information Sciences Center, will examine the role of government in developing cutting-edge technology.

Chemical Engineering and Materials Science
Associate professor *Frank Bates,* formerly with AT&T Bell Laboratories, joined the department in winter 1989. His research focuses on phase behavior in polymer blends and block copolymers. Professor *Edward Cussler* was appointed education director for IT's Center for Interfacial Engineering. *H. Ted Davis,* professor and department head, was inducted into the National Academy of Engineering in September. *Alfonso Franciosi,* associate professor, holds the solid-state physics chair at the University of Rome, Italy, for winter quarter 1989. Professor *Arnold Fredrickson* received the Food, Pharmaceutical, and Bioengineering Division Award from the American Institute of Chemical Engineers (AIChE). Professor *Chris Macosko* received the AIChE's Materials Engineering and Science Division Award. *Martha Mecartney,* assistant professor, won a five-year, $500,000 Fellowship in Science and Engineering from the David and Lucile Packard Foundation. The fellowship aids the careers of young scientists and engineers and encourages them to stay in academia. The California Institute of Technology named professor *L.E. Scriven* the Sherman Fairchild Distinguished Scholar for winter quarter 1989.

Chemistry
The following faculty received promotions in July: *Margaret Etter* (to associate professor), *Wayne L. Gladfelter* (to professor), and *Timothy P. Lodge* (to associate professor). Regents' professor *Paul Gassman* was elected 1989 president-elect of the American Chemical Society (ACS) in November. He will serve as president in 1990 and will be an ACS board member from 1989 to 1991. *Scott D. Rychnovsky,* assistant professor, joined the department in fall 1988 with research interests in organic chemistry/organic synthesis.

Civil and Mineral Engineering
Roger E.A. Arndt, professor and director of the St. Anthony Falls Hydraulic Laboratory, chaired all cavitation sessions of the International Symposium on Hydraulics for High Dams in Beijing, China, on a trip sponsored in part by Japan's Ministry of Education. *Dimitri Beskos,* visiting professor from the University of Patras, Greece, for winter and spring quarters, is teaching graduate courses in structural engineering. *Richard Braun,* adjunct professor and director of the Center for Transportation Studies, received the Thomas H. McDonald Memorial Award from the American Association of State Highway and Transportation Officials. He chaired the Governor's Blue Ribbon Commission on Cold Weather Research, which gave its recommendations to Gov. Rudy Perpich in November. Professor *Patrick Brezonik* is chair of the National Association of Water Institute Directors. Assistant professor *Catherine French* received a faculty adviser award from the American Society of Civil Engineers (ASCE) in November. Professor *Ted Galambos* received the 1988 Shortridge Hardesty Award from ASCE's structural division. *John Gulliver,* associate professor, was appointed chair of ASCE's hydrologic transport and dispersion committee. *Roberto Leon,* assistant professor, conducted stress tests on St. Paul's Wabasha Street Bridge, using new fatigue analysis techniques to determine how long the bridge will last. Leon also received the ASCE 1988 Edmund Friedman Young Engineer Award for Professional Achievement. *David Newcomb,* assistant professor in pavement engineering, joined the department in January. *Kenneth J. Reid,* professor and director of the Mineral Resources Research Center, is program manager for a statewide multiagency clay resource project funded by the Legislative Commission on Minnesota Resources. *Vaughan Voller,* associate professor, was promoted from assistant professor in September.

Geology and Geophysics
Peter Hudleston, professor and department head, is the first vice chair of the Geological Society of America's structural geology and tectonics division for 1988-89, and will be chair in 1989-90.

History of Science and Technology
The American Association for the Advancement of Science named professor *Edwin T. Layton* chair of Section L (History and Philosophy of Science) for a three-year term from 1989 to 1991.

Mathematics
Richard B. Moeckel, associate professor, was awarded an Alfred P. Sloan Foundation Research Fellowship.

Mechanical Engineering
Diana D. Brehob, assistant professor, received the 1988 Ralph R. Teetor Educational Award from the Society of Automotive Engineers. Professor *Arthur G. Erdman* received the 1988 American Society of Mechanical Engineers (ASME) Mechanisms Committee Award. ASME's mechanisms committee also awarded Erdman, with graduate student Salah Faik, its 1988 best paper award. *Richard J. Goldstein,* professor and department head, was made an honorary member of the Golden Key National Honor Society in November. The University's Faculty Consultative Committee selected professor *Warren E. Ibele* to chair the Senate Finance Committee. Professor *Virgil A. Marple* received the first David Sinclair Senior Investigator Award from the American Association for Aerosol Research. Professor *Donald R. Riley* is a board member of Minnesota Advanced Manufacturing Technology Centers Inc., a non-profit corporation that helps small to mid-sized Minnesota businesses compete in the world marketplace. *Kim Stelson,* associate professor, received about $96,000 in industrial automation hardware and software from Texas Instruments Inc. to set up a new undergraduate laboratory for programmable automation. The company awarded these grants to eight out of 40 universities, based on leadership in control engineering technology and research. *Paul J. Strykowski,* assistant professor, joined the department's heat transfer division in September. *Kumar K. Tamma,* associate professor, was elected to the editorial board for the international journal, *Communications in Applied Numerical Methods.* With graduate student Sudhir B. Railkar, Tamma won the best paper award for Post Session HT 1 at ASME's annual winter meeting.

Physics and Astronomy
James Kakalios, formerly a condensed matter experimentalist at the Xerox Palo Alto Research Center, joined the physics faculty in fall as an assistant professor. **I**

ALUMNI

The hometown advantage: Cyrus community nurtures high-tech talent

Most of us wouldn't consider Cyrus, a small town in western Minnesota, the place to find America's future corporate leaders. But alumnus Richard Hanschen (Electrical 1945) and the community of Cyrus feel differently, and through their separate efforts, the town known mostly for its diversified farming may produce quite a high-tech crop.

Cyrus native Hanschen, a former Texas Instruments executive who now heads a business that invests in new technology companies, wants to give hometown talent a chance to develop. Hanschen's donation of $300,000 to the Institute of Technology (IT) established the Cyrus Scholarship Endowment Fund, which will provide as many as six students a year with up to $3,000 each.

The endowment stipulates that the students must be from the Cyrus area, must be willing to attend IT, and must express an interest in becoming a corporate leader.

Hanschen established the scholarship fund because he "is very much concerned about the future leadership of technology companies," says Robert V. Hanle, associate to the dean and director of external relations for IT. Hanschen believes that future leaders need an engineering and science background for high-tech industry to survive and compete, Hanle says. Indeed, that background may be more valuable to a CEO than business school, Hanschen says.

With that in mind, students from Cyrus may have a jump on many youngsters who are headed down the business track. On September 5, 1989, Cyrus' one elementary school will reopen as a magnet school called the Cyrus Math, Science, and Technology Elementary School.

If not for the creation of the magnet school, Cyrus' 87 elementary students probably would have been sent to neighboring Morris. As its name implies, a magnet school attracts students from other school districts to increase enrollment. The community hopes students will choose the Cyrus school because of its unique curriculum.

"We're excited that we can maintain a small school," says Pamela Solvie, a primary grade teacher who helped write the proposal for the magnet school. "Our goal is to keep this school in a rural community and to prepare students for the future—not just to isolate them in the 'backwoods.' "

While the school's creation had nothing to do with the scholarship fund, IT's Hanle calls it "an interesting spin-off" of Hanschen's concern for fostering student interest in mathematics and technology.

"It's what I call a ripple effect in a community," says Hanschen, in a telephone interview from his office in Dallas. In fact, Hanschen, who has seen the proposal for the Cyrus magnet school, says he is "very excited about it, because it gives me a model to give to other people in other states." People want to find ways to promote quality education in the fields of technology and science, he says, but they don't always know how to go about it. The magnet school provides a good example.

Hanschen already has sent copies of the magnet school proposal to people in other states. "If they can do that up there [put a magnet in Cyrus], we can encourage other wealthy people to support this in other parts of the country," Hanschen says.

The magnet school may be "more important than the scholarships, per se," Hanschen says. As he sees it, Cyrus students will have a good education, and what's more, they will have the values that are shaped only in rural America.

"In the rural community you tend to be raised by the community, and, therefore, you gain a really good understanding of human nature," Hanschen says. "You know the barber and his kids. You learn a respect for people, regardless of what they're doing." What's more, Hanschen says, everyone in a small town has to participate in many activities. "In a big city, you get specialized and do one thing. In a small town, I had to sing in the choir. I was the best monotone they had," he jokes.

People in rural communities often do things because they must, or else things don't get done. Corporate leaders need that skill, Hanschen argues. "Leaders in industry often have to do the things you don't want to do, but have to."

If Hanschen is correct, those rural values plus a strong background in technology produce good leaders, and if the Cyrus magnet school succeeds, then corporate America soon will have more talent from which to choose. I

By Miriam Feldman

1940

Willard W. Parker *(Aerospace)* is manager for the Los Angeles sales office of Simpson Electric Co., Elgin, Ill.

1951

David E. Lundstrom *(Electrical)* retired from Control Data Corp. in 1985 as a computer engineer. MIT Press published his book on the early days of the Twin Cities computer industry, *A Few Good Men From Univac,* in 1987.

1953

Robert L. Thorson *(Architecture)* is president of Carson, Lundin & Thorson P.C., New York, N.Y., an architectural design firm specializing in bank and corporate interiors.

1966

Robert T. Peterson *(Electrical)* is supervising the design and construction of 19 broadcast studios at Voice of America in Washington, D.C.

1970

Dennis K. Kreid *(Mechanical, Ph.D.),* chief scientist of Battelle Northwest's energy sciences department, Richland, Wash., also manages the Office of Superconductor Technologies for Pacific Northwest Laboratories, operated by Battelle for the U.S. Department of Energy.

1971

Robert Uebelacker *(Mechanical),* a pilot for the U.S. Air Force, was recently promoted to lieutenant colonel and assigned as director of aircrew training for the 17th Reconnaissance Wing, RAF Alconbury, United Kingdom.

1972

James A. Blomquist *(Architecture)* is construction manager for Melvin Simon & Associates Inc., Indianapolis, Ind.

1973

Eugene J. Stroebl *(Mechanical),* facilities engineering manager in the research and development division of Pillsbury Co., chairs the Minnesota section of the American Society of Mechanical Engineers.

1975

Robert W. Fennell *(Chemistry)*, an application engineer for Dayco Products Inc., Springfield, Mo., currently works on industrial and agricultural V-belt power transmission drive applications.

1976

Suzanne Jiwani *(Civil and Mineral)* is president of the Minnesota Society of Professional Engineers, the first woman to hold that post. A civil engineer for Barr Engineering Co., Bloomington, Minn., she earned her master's degree in civil engineering from Colorado State University in 1981.

1978

Dana Johnston *(Geology, M.S.; 1983 Ph.D.)*, assistant professor in the University of Oregon's Department of Geology, spent summer 1988 building a high-pressure/temperature lab to investigate the production of granite magmas by melting sediments during ultrametamorphism.

1979

Dhamo S. Dhamotharan *(Civil and Mineral, Ph.D.)*, vice president of Woodward-Clyde Consultants, Baton Rouge, La., was elected managing principal by Woodward-Clyde's board of directors.

Rodney G. Wolff *(Chemical, 1980 Materials Science)* is a research and development project engineer for Medtronic Inc., Minneapolis. He received his MBA from the College of St. Thomas and has been married to his wife, Holly, for four years.

1980

Ed Petil *(Civil and Mineral)* is a supervisory materials engineer for the California Department of Transportation in Orange County, Calif.

1983

Warren B. Jokinen *(Electrical)*, a self-employed automation director, provides programming and art-production services to local advertising agencies and national accounts. Before starting his business, he was with Honeywell Inc.'s optical disk storage products division.

1984

David M. Bahnemann *(Aerospace, 1986 Mechanical)* is a mechanical engineer for Cushman Electronics, San José, Calif.

Karen Anne Lenz *(Civil and Mineral)* is a structural engineer for Setter Leach and Lindstrom, Minneapolis, and has a daughter, Emily.

Karen Louise Wiemeri *(Civil and Mineral)* is a civil engineer for Bonestroo, Rosene, Anderlik, and Associates, Roseville, Minn., and expects to complete her MBA from the College of St. Thomas this spring.

1985

Anthony C. Peterson *(Civil and Mineral)*, a structural engineer with Arvid Grant and Associates, Olympia, Wash., received his master's degree from Cornell University in 1986.

Zlatko Tesanovic *(Physics, Ph.D.)* received a Fellowship in Science and Engineering from the David and Lucile Packard Foundation. The five-year, $500,000 award aids the careers of young scientists and engineers and encourages them to stay in academia.

1986

Eric H. Henrikson *(Computer Science)*, a software engineer for AT&T Bell Laboratories, Chicago, Ill., recently received an M.S. degree in computer science from Northwestern University.

Hitoshi Kuwamura *(Civil and Mineral, Ph.D.)*, a manager in Nippon Steel Corp.'s Japan research laboratory, presented a paper at the Structural Stability Research Council conference at the University Radisson in April.

Andrew P. McDonald *(Mechanical)* is a facilities engineer for the U.S. Naval Academy, Annapolis, Md.

Timothy J. Nikolai *(Aerospace)* was recently named program engineer for the Civil Reserve Air Fleet's Aeromedical Evacuation Ship Sets program at Brooks Air Force Base, Texas.

1987

Dipankar Choudhury *(Mechanical, Ph.D.)* conducts engineering research in computational fluid dynamics for Creare Inc., Hanover, N.H., a firm of consulting research and development engineers. He married University alumna Santosh Sangarasivam in Minneapolis in August. I

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Job

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ALUMNI NEWS

Alumni who shine

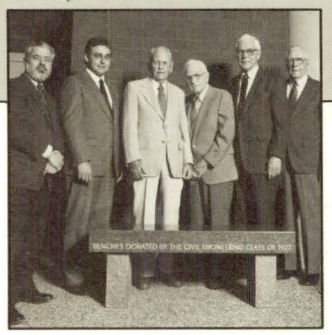
K. Carl Nomura (Physics 1948 B.S., 1949 M.S.; Electrical 1953 Ph.D.) and Ruth Annette Reck (Chemistry 1964 Ph.D.) received Outstanding Achievement Awards (OAAs) at the Institute of Technology Alumni Society's annual Science and Technology Day banquet October 4.

The highest honor conferred on University alumni, the award recognizes exceptional professional accomplishment.

Nomura, who completed the advanced management program at Harvard Graduate School of Business, joined Honeywell Inc. in 1953. An early advocate of integrated circuits, he was instrumental in the company's switch from electro-mechanical products to solid-state devices. A fellow of the American Physical Society, Nomura retired in 1986 as Honeywell's senior vice president.

Reck is assistant manager for painting technologies for General Motors Research Laboratories. An authority on global atmospheric modeling and climatic effects of aerosols, she has served on the Science Advisory Board of the U.S. Environmental Protection Agency and is a U.S. delegate to the United Nations Scientific Council on Problems of the Environment. I

Photo by Chris Faust



(Left to right) IT dean Ettore Infante, department head Steven Crouch, and Class of 1927 alumni Elmer Christenson, Abe Sperling, Laurence Johnson, and C.K. (Nick) Preus.

Noted

The civil engineering class of 1927 held its 61st reunion in June and donated the five granite benches now in the Civil and Mineral Engineering Building's rotunda. I

DEATHS

Luis Ferreiro *(Chemistry 1986 Ph.D.),* in July 1988.

Fulton Koehler *(Mathematics 1939 Ph.D.),* 73, professor of mathematics from 1942 to 1972. After leaving the University, he cofounded Seiscom Delta Inc., a Houston-based resource service for energy exploration firms. He was later senior vice president of Seismic Research Corp., a Houston consulting firm.

Robert B. Krebs *(Mechanical 1960),* 56, a self-employed manufacturer's representative.

James E. Nauss *(Chemical 1948),* who retired in 1982 after 30 years with E.I. DuPont de Nemours & Co. He worked in research and development and held the positions of production superintendent, employee relations superintendent, and environmental and safety superintendent.

William F. Pohl, 51, professor of mathematics at the University for nearly 25 years. A respected teacher who expected a lot from his students, Pohl was also an accomplished musician. He played five instruments, cofounded a Renaissance ensemble, started a Gregorian chant choir, directed a church choir, and sang in the Twin Cities Catholic Chorale. Described by colleagues as a great intellectual, he graduated from high school at age 16, earned his bachelor's degree in two and one-half years, and finished his doctorate by age 23.

John J. Uppgren *(Mechanical 1943, Metallurgy and Materials Science 1949 M.S.),* an instructor in the mechanical engineering department from 1949 to 1951 who later worked for FMC Corp. I

Correction

Two photographs in the fall 1988 issue of *Items* were incorrectly attributed. The photo on page 5, and the larger black-and-white photo on page 4, were taken by Chris Faust of Space Science Graphics. I

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