

Also in this issue

Director's column / 2

Chaired professorship for Blakely / 2

New facility for research on mesoscale processing and analysis under construction in Bard / 3

Class of '99 / 4

Student news / 5

Interdisciplinary research projects / 6

Faculty news / 7

Johnson lectures / 7

Alumni news / 8

Ober begins first year as director

Christopher K. Ober, a member of the MS&E faculty since 1986, was appointed director of the department for a three-year term beginning January 1.

Ober also carries out an active research program, with funding from both government agencies and industry. Current research includes fundamental studies of self-organization in liquid crystalline polymers and functional block copolymers, and the creation of new materials for electronic packaging and microelectronics.

His activities include participating in undergraduate as well as graduate research programs. He has served as director of graduate studies in MS&E, as department representative to the Cornell Center for Materials Research, and as a member of the User Committee of the Cornell Nanofabrication Facility.



Ober

Ober received the Ph.D. in 1982 from the University of Massachusetts, and worked for several years at the Xerox Research Centre of

Canada before joining the Cornell faculty. In 1993, he spent a sabbatical year at the Max Planck Institut für Polymerforschung in Mainz, Germany, as recipient of a von Humboldt fellowship.

Ober is an associate editor of *Macromolecules* and chair of the Polymeric Materials Science and Engineering (PMSE) division of the American Chemical Society. He is a member also of the American Physical Society.

Ober's views on the state of the department and its expectations are outlined on page 2 in his first column for *MS&E News*.

New building for advanced research and teaching in nanotechnology and related fields to open in 2003



An architectural drawing of Duffield Hall as seen from the south roof of Hollister Hall shows its proposed location on the Engineering Quadrangle, west of Phillips Hall and north of Upson Hall.

Duffield Hall will be one of the country's most sophisticated research and teaching facilities for nanotechnology, nanobiotechnology, and the development of novel materials when it opens in the fall of 2003.

The three-story building, with a penthouse and a large atrium, will be located on the Engineering Quadrangle, according to Mark Spiro, associate dean and Duffield Hall project leader at the College of Engineering. The building is to be about the height of Phillips Hall and a third larger in area—about 150,000 gross square feet in all.

A number of Cornell facilities and programs will be housed in Duffield. These include the Cornell Nanofabrication Facility and components of the growing nanobiotechnology program. Up to 25 research groups from several colleges will be accommodated. Various characterization instruments from the Cornell Center for Materials

(continued on page 8)

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Recent issues of *MS&E News* are available on the Web.

Cornell University is an equal-opportunity, affirmative-action educator and employer.

✉ Alumni attending the Cornell reunion June 8-11 are invited to attend the MS&E breakfast on Saturday, June 10, 2000, in the Bard Hall Lounge (Room 260) from 8:30 to 9:30. Friends, spouses, and children are also welcome. Please contact Carol Armstrong (607/255-9617; ca20@cornell.edu) if you plan to come.

FROM THE DIRECTOR

It is a pleasure for me to write to you as new director of Materials Science & Engineering. Jack Blakely has completed his second term as director and is now on a well-earned sabbatic leave for the spring semester. Jack presided over a number of important initiatives, including a revamping of the undergraduate curriculum, the beginning of an upgrade of chemical processing facilities in Bard Hall, and the hiring of several new faculty members (Yuri Suzuki, Shefford Baker, George Malliaras, and Uli Wiesner). Our new faculty members have won an impressive array of national and international awards.

My term as director promises to be equally eventful.

- The much-anticipated construction of Duffield Hall is coming closer to reality; plans for this \$50+ million building are nearly finalized. This new facility will accommodate and stimulate advancement in important ways:
 - The capability of the Cornell Nanofabrication Facility will significantly increase.
 - Much-needed space for advanced materials research will be added.
 - The building will house the new Nanobiotechnology Center, which has been funded by NSF—at a level comparable to that of the Cornell Center for Materials Research (CCMR)—in recognition of Cornell's expertise in the area of nanotechnology. This new center is co-directed by Harold Craighead (Applied and Engineering Physics) and Carl Batt (Food Science), and several MS&E faculty are founding members.
 - Interdisciplinary research will be facilitated. Already a team headed by Steve Sass and composed of faculty in MS&E, chemistry, and chemical biology has received a multimillion-dollar industrial grant.
- A major renovation is underway in Bard Hall. Over the next few years, we will see improvements in public spaces, a thorough upgrade of the air-handling system, and establishment of a new Mesoscale Processing and Analysis Facility for advanced work in the processing of small-scale polymers and thin films. This new facility will serve as a bridge between the nanoscale world of molecular dimensions and the macroscopic—a size range of increasing importance in science and technology. It is to become part of the CCMR facility network located around campus. It will be housed in Bard in a laboratory now under construction; a major fundraising campaign for that project is underway with the support of the College of Engineering.
- In a new venture, we are inviting graduate-school candidates to visit Cornell for a weekend at the end of March. Together with the Departments of Applied & Engineering Physics, Chemical Engineering, and Physics, we will offer joint activities for the students. Science and engineering are becoming increasingly interdisciplinary, a characteristic for which Cornell is noted. We expect that these joint activities will convey the fact that MS&E students at Cornell are a part of an outstanding larger materials community.
- The reputation of any department is built on many things. They of course include the quality of the faculty and the teaching and research facilities, but most important is the quality of the students. I would like to encourage all our graduates to come to alumni weekend this year. There have been so many exciting changes to the department and the university in the recent past that I believe you would find a visit very interesting. Please let us know if you plan to come and be sure to drop by and see us. —Chris Ober, Director, Department of Materials Science and Engineering

Blakely named to chaired professorship

When Jack Blakely finished his latest term as director of the MS&E department last December, he had a new role: the Herbert Johnson Professorship. The chair appointment was honored at a college awards ceremony in September.

Blakely, who joined the MS&E department in 1963, served two terms as director— from 1988 to 1993 and from 1997 to 1999.

Throughout his teaching career, he has also maintained an active teaching and research program; currently his projects are funded by the National Science Foundation. Much of his

research is concerned with surfaces and interfaces. He has recently been focusing on electronic materials and oxide glasses.

Blakely came to Cornell in 1963 after completing doctoral study at the University of Glasgow and spending two years as a research fellow at Harvard University.

He has held appointments at Sandia Laboratories, the Cavendish Laboratory in Cambridge, England, the Argonne National Laboratory, the University of California at Berkeley, and York University, U.K., and he has been a consultant to numerous government and industrial laboratories and agencies.



Blakely

New lab for mesoscale processing and analysis, upgrade of ventilation system in the works for Bard

Two ongoing multi-million-dollar renovation projects in Bard Hall will upgrade facilities needed to support developing research and teaching programs now and in the future.

A state-of-the-art Mesoscale Processing and Analysis Facility, now under construction on the third floor, will make Cornell a major national center in the growing field of research on polymer materials. That is the prospect envisioned by department director Christopher Ober, who is overseeing the design. The facility is expected to be operational by the fall term.

The other project, a thorough renovation of the ventilation system, will be important not only for the new facility, but for overall research capability and for compliance with EPA/OSHA safety standards, according to Robert Geyer, MS&E director of administrative operations.

The need for the new facility

At Cornell the study of polymeric materials has become increasingly important. The MS&E faculty includes five specialists in this area—Ober, Emmanuel Giannelis, David Grubb, and two recently appointed professors, Ulrich Wiesner and George Malliaras—and future appointees are likely to include specialists in biomaterials.

The research program in the department includes work in such rapidly developing research areas as nanocomposites, light-emitting polymers, self-assembling polymers, photoresists, polymer electronics, and nanometer-scale processing of soft matter, especially polymers. Developments in these and related areas have potential applications in a range of technologies, including microelectronics, food packaging, and medicine.

The Mesoscale Processing and Analysis Facility will operate in conjunction with other Cornell facilities, Ober said. MS&E is working with the Cornell Center for Materials Research (CCMR) to provide long-term support, including technical staff and new equipment. Also, the

Administrative assistant joins staff

Julie Chan joined the department last September as an administrative assistant.

She is a 1999 graduate of Aquinas College in Grand Rapids, MI, with a B.A. in psychology. Before joining the MS&E staff, she worked as a legal administrator and secretary while pursuing her degree.

laboratory will complement research carried out in the planned Duffield Hall. For example, results of research on small-scale processing of polymers, conducted at Duffield, could be translated into new materials synthesis at Bard.

The laboratory will also benefit from the proximity of other facilities, including the Cornell High Energy Synchrotron Source (CHESS) and the Advanced Electronic Packaging Facility.

The MS&E department has committed \$300,000 in seed money for the Mesoscale Processing and Analysis Facility, and it is hoped that fundraising efforts begun last fall will ultimately provide \$1 million to complete the project.

Importance of the air-handling system

The increased capacity of the air-handling system will initially provide six additional chemical fume hoods, Geyer said. Despite the upgrade of Thurston Hall facilities some years ago, hood space is rapidly becoming inadequate for the overall research and teaching program in MS&E.

The \$2.85 million project is being carried out in stages, beginning with replacement of the air-supply system to double its capacity. Subsequently, ducts, fan coils, and the perimeter heating system will be replaced. The project is funded by Maintenance Management at Cornell.

— Obituary —

John Perry Howe, who was director of the MS&E department from 1962 to 1965, died in La Jolla, CA, on June 18. He was 88.

He was a member of the University of Chicago team that created the world's first self-sustaining nuclear chain reaction and was involved in reactor design for the Manhattan Project. His later career included work in advanced energy systems in government and industrial laboratories.

Howe was at Cornell from 1961 to 1967, first as the Ford Professor in engineering physics. His fields of teaching and research were engineering physics, nuclear science and engineering, and nuclear materials.

Holidaytime brings out MS&E talent



Musical numbers, a juggling act, and a magic show—all with MS&E talent—were innovations that helped make the department's 1999 Christmas party a memorable one. Also expanded was the number of celebrants—they included students as well as faculty and staff members and their guests.

The musicians shown here are, left to right, Wendbi Lai (a 1999 graduate now an M.Eng. student in operations research), Professor Jack Blakely, Professor Yuri Suzuki, and (at the keyboard) Pat Ober. Other performers were graduate student Gina Weibel with a juggling act, Professor Shefford Baker on guitar, and Professor Mike Thompson with his "Materials Magic Show." Suzuki spearheaded the showcase event.

MS&E graduates 35 in Class of '99



Industry and graduate education are about evenly represented in the after-graduation choices of the MS&E Class of 1999, according to a survey of the 35 B.S. degree recipients. Of the 24 who have provided information, half are employed and half are seeking higher degrees.

Those who have joined industrial organizations are Jaime L. Ballester (Fortex-Fortiflex), Karen P. Clayton (WinMill Software), Susan B. Clyburn (Paradigm Consulting), Jamila A. Cutliff (Procter & Gamble), Edward L. Hutchins (Advanced Technology Materials), Chen-Lin Lee (Price Waterhouse Coopers), Margaret L. Mellon (Kinderhook Systems), Eric K. Reeve (Liberty Mutual—

Two 1999 graduates receive Amoco Research Prizes

Two graduating seniors—James Hulvat and Edward Hutchins—were awarded Amoco Research Prizes for 1999 in recognition of the excellence of their senior theses. The prizes are part of Amoco's program of annual support for undergraduate research in MS&E.

Hulvat's thesis, "Formation of Aluminum Borate, $Al_{18}B_4O_{33}$, at a Platinum-Sapphire Interface," was based on research conducted with Professor Stephen Sass. Hutchins worked with Professor Christopher Ober; his thesis was titled "The Creation of a Nanoporous Polymeric Film."

Hulvat was also one of six Cornell engineering seniors to receive 1999 National Science Foundation Graduate Research Fellowships, which provide three years of support. In 1997 Hulvat won the Gregg Prize for the outstanding junior in MS&E.

Earlier in his senior year, Hutchins was awarded scholarships from both the Minerals, Metals, and Materials Society and the American Society for Metals Foundation.

Above: The class of 1999 on Graduation Day.

software engineer), Christopher M. Regan (Lockheed Martin), Alex J. Simmons (Watkins-Johnson), Nick E. Williamson (Prismark Partners LLC), and Melanie Wuthenow (Prismark Partners LLC).

Those headed for graduate programs at Cornell are Seok Beom Cheon, Ka Wa Kevin Chu, Edward F. Kaste, Diane W. Lai, Frank Mischler, Jesse Phou, and Philip Ray-Chee Poh. Those planning to enter graduate programs at other universities are Land J. Belenky (Duke), James F. Hulvat (Northwestern), Man Chung Peter Law (California), Eric Saphir (Franklin Pierce Law Center), and Christopher R. Stanek (Imperial College, London).

Graduating seniors in addition to those listed above are Robert D. Burak, Jason I. Demby, Craig C. Dunton, Adam W. Feinberg, Aaron M. Gibby, Diana W. Landwehr, Scott M. Levy, Nicholas A. Pesola, Giuliano T. Petrih, William J. Robinson, and Terrence Seah.

Three Ph.D.s among recent recipients of graduate degrees in MS&E

Three doctorates were among the graduate degrees in MS&E awarded in the spring, fall, and winter. Thomas J. Barbieri, whose faculty adviser was Stephen Sass, is now an assistant professor of physics at Simmons College. The other Ph.D. recipients are Jacob Heier and Hideaki Yokoyama, advisees of Edward Kramer. Heier is now a postdoctoral associate at the University of Groningen, Netherlands; Yokoyama has returned to Japan and working for Bridgestone Tire.

M.S. degrees were awarded to Danny Chen and Hansuk Kim, advisees of Dieter Ast. Chen is continuing his work toward the Ph.D. Kim, on leave from Cornell, is employed at LG Industries in Korea.

The M.Eng. degree was awarded to Andrew John Darlak.

Annual Gregg Prize honors the outstanding junior in MS&E

The 1999 James L. Gregg Prize for the outstanding junior in MS&E was awarded to Deborah Schorr. A cash award accompanied the honor.

Schorr has been particularly active in research. Last summer she participated in an undergraduate research program through Carnegie Mellon University's materials science department, and during the fall term back at Cornell she worked on the mechanical properties of nanocomposite polymers. She is also active in the community service fraternity Alpha Phi Omega, the Materials Research Society, and the Ithaca Sirens women's ice hockey team.

Last year the Gregg Prize was awarded to Panitarn Wanakamol, a student from Thailand, who is at Cornell on a four-year scholarship from the Thai government.

Wanakamol began doing research in the second semester of her freshman year. She is active in the Cornell Thai Association and hopes to earn a Ph.D. and go back to Thailand to teach.

Dragana Culjovic receives SPIE fellowship and SWE scholarship

Two awards in support of research have been received by senior Dragana Culjovic: a fellowship from the International Society for Optical Engineering (SPIE) for 1999-2000, and a Microsoft Corporation-Society of Women Engineers (SWE) scholarship for the current academic year.

The SPIE fellowship was awarded for research, conducted under the supervision of Professor George Malliaras, on light-emitting diodes made from liquid-crystalline electron-transporting molecules. In 1999 Culjovic co-authored a paper on this topic. This year she is working on research for her senior thesis, "Simulation and Numerical Analysis of Injection and Mobility in Organic Light-Emitting Diodes."

The SWE scholarships, funded by various corporations, are open to women majoring in engineering or computer science. Last year SWE had over 2,500 applications for 39 scholarships.

Grad student to participate in summer program in Japan

A graduate student in MS&E has won an NSF award to participate in the Monbusho Summer Project in Japan. Rong Fan, whose Cornell adviser is George Malliaras, will visit Professor Tsutsui's laboratory in the materials science and engineering department of Kyushu University. She will study charge transport in liquid-crystalline semiconductors.

Students win awards in support of research

Undergraduates in MS&E are participating in faculty-supervised research as recipients of awards from three programs at Cornell.

In the Cornell Presidential Research Scholars Program, students are awarded scholarships during their first year and work with a faculty member on research conducted over the four undergraduate years. The MS&E students in the program, and their faculty mentors, are: Chau-Jean Lin '02 (Shefford Baker), Steve Cypes '02 (Emmanuel Giannelis), and Kirvan Chao '01 (Stephen Sass).

MS&E students and faculty participants this year in the GE Faculty for the Future Undergraduate Research Program are Linnea Hartsuyker '00 (Stephen Sass), Yana Matsushita '00 (Yuri Suzuki), and Emily Klein '00 (Jack Blakely). This program, for women and members of under-represented minority groups who are studying at Cornell in engineering, computer science, or physics, provides a stipend during the academic year and during a summer.

In the Alumni Undergraduate Research Program, engineering students and faculty members propose research projects of mutual interest and the students may earn either academic credit or a stipend. Student and faculty participants this year are Rojana Pornprasertsuk '01, Naa-Dei Nikoi '00, and David Portner '01 (Rüdiger Dieckmann); Pongpun Piromreun '00, David Allen '00, and Daniel Jacobs '01 (George Malliaras); Panitarn Wanakamol '00 and Eric Verploegen '02 (Stephen Sass); and Vikram Joshi '01 (Ulrich Wiesner).

Electronic packaging prize awarded to Brice Wu

Brice Wu, a senior, is this year's recipient of the Electronic Packaging Prize. A cash award accompanied the prize.

Wu worked for three years with Professor Che-Yu Li in the Electronic Packaging Program and has also worked for Li's start-up company High Connection Density, Inc. Currently, he is serving as a teaching assistant in the MS&E course on electronic packaging.

Wu is president of the honorary society Alpha Sigma Mu.

Research initiative earns MRS fellowship for Daniel Allen

Daniel Allen, a senior, has won an Undergraduate Materials Research Initiative (UMRI) fellowship from the Materials Research Society (MRS). Allen was one of 40 students chosen from applicants from 19 countries.

He will receive a cash honorarium upon completion of a final report which is to include a journal article and a poster presentation at the MRS spring meeting in San Francisco.

Allen is currently working with Professor George Malliaras on organic blend-based photovoltaic devices. He hopes to continue work in this area in graduate study at the University of California at Santa Barbara.

As a junior, Allen received an Alumni Undergraduate Research Fellowship.

➤ *Last year the MS&E student team won a first prize in the local Engineering Day at the Mall event; this year they are looking for more awards.*

The exhibition and contest, held annually on a Saturday in late February during National Engineers Week, is sponsored by the College of Engineering, local companies, and the Sciencenter in Ithaca. Pyramid Mall passers-by visit hands-on exhibits prepared and staffed by the participating organizations, including student groups in the various engineering disciplines. Prizes in a number of categories are awarded.

In 1999 the student chapter of the Materials Research Society won the \$50 first prize in the "Most Technically Diverse" category. The project was organized by Nick Pesola.

Three projects illustrate a growing trend: Interdisciplinary and industry-allied research at Cornell

1. A new type of integrated circuit

The merger of traditional silicon-based microelectronics with new organic semiconductors and flexible structures could lead to an era of cheap and highly portable “throwaway electronics.” This possibility is being studied at Cornell by a team of researchers representing four disciplines.

The long-term goal is to understand the fundamental issues underlying the “marriage” of current technologies—including those for thin-film silicon transistors (TFTs), organic light-emitting diodes (OLEDs), and low-temperature flexible polymer substrates—to yield hybrid products. Such hybrids are likely to dominate future devices such as portable cellular phone displays, flexible laptop computers, and paper-thin wall-sized televisions. By exploiting the unique advantages of each technology, total system costs could be reduced and performance enhanced.

The objective of the Cornell project, which is funded by the National Science Foundation at \$1.7 million, is to simulate and model these materials and their interfaces in an effort to understand the underlying science. There are tremendous challenges, since the materials extend across not only the organic/inorganic boundary, but also across all length scales of order from disordered amorphous materials to ordered single crystals.

One approach is to study the development of order by comparing organic “crystallization” (in small molecules and polymers) with the known properties and structures of amorphous, microcrystalline, and polycrystalline silicon and germanium. Another approach is to develop theoretical and computational models of the interfaces that must develop between these organic and inorganic materials.

Faculty members on the Cornell research team include Paulette Clancy (the team leader) and Fernando Escobedo of Chemical Engineering, Michael Thompson and George Malliaras of MS&E, Edwin Kan of Electrical Engineering, and Michael Teter of Physics.

In experimental work, Thompson will study inorganic semiconductors and their interfaces with polymer substrates, Malliaras will study organic materials and metal/organic interfaces, and Kan will study extremely small electron devices called nanodots. Teter will develop quantum mechanical codes to model these materials. Clancy and Escobedo, using such codes, will attempt to predict the molecular and interface structures. Kan will also lead the effort to reduce large computational datasets to simple predictions for comparison with experiments.

2. Large flat-screen displays

A company founded by two Cornell professors—Che-Yu Li, the F. N. Bard Professor of MS&E, and Peter Krusius of Electrical Engineering—and two IBM executives has made a joint development agreement with a unit of Royal Philips Electronics of the Netherlands. Li is the local company’s chairman and Krusius is a technical consultant.

The spinoff company, Rainbow Displays Inc. (RDI) was formed several years ago to develop color flat-screen television and video technology invented at Cornell. It was established with the aid of the Cornell Research Foundation (CRF), which licensed the patents to RDI.

CRF began helping to exploit Cornell-developed inventions about 12 years ago. Part of the royalties and other fees received by the foundation are used to help other inventors on campus.

RDI has developed an active matrix liquid crystal display (AMLCD) prototype that is capable of full-motion color video with high resolution and is larger in size (38.6 inches diagonal) than any comparable unit on the market. Large flat-panel displays are considered ideal for high-definition television (HDTV) and for uses requiring large screens.

Under the new agreement, RDI and Phillips are jointly developing displays in other formats and resolutions for HDTV.

3. Electronic packaging problems

Professors Li and Krusius are collaborating in research not only on flat-screen displays, but also on studies of an electronic packaging dilemma. They and MS&E professor Emmanuel Giannelis head three research groups that are working to solve problems caused by the huge discrepancy in size between exterior devices, such as buttons, and interior chip features that are some five orders of magnitude smaller.

The group headed by Krusius is trying to construct a chip with interconnections arrayed not just on the periphery, but on the entire bottom area. They also hope to find a way to prevent electrical interactions among the densely packed connections.

The challenge being addressed by Li’s group is to find connec-

tion materials that will not shear off as heat generated by the chip causes expansion.

Giannelis’ group is seeking to develop capacitors, possibly composite films containing nanocrystals, that could be placed close to the connections; these would be able to take care of electrical interference and also store electrical energy to prevent information loss.

The project is supported by the Semiconductor Research Corp., an industrial research consortium. And through the Electronic Packaging Program at Cornell, it has funding also from NSF and from the Industry–Cornell University Alliance for Electronic Packaging.

Baker wins teaching award

Just two years after he joined MS&E as an assistant professor, Shefford P. Baker received a College of Engineering teaching award. He is the 1999 recipient of the Robert '55 and Vanne '57 Cowie Excellence in Teaching Award, one of 20 that have been established by alumni.



Baker

Last year Baker received an NSF Faculty Early Career Development Award in support of his research on deformation mechanisms in thin metal films.

Baker earned the Ph.D. at Stanford University in 1993 and came to Cornell after five years on the scientific staff of the Max-Planck Institut für Metallforschung in Stuttgart, Germany.

Giannelis named full professor

Emmanuel P. Giannelis, who joined the MS&E faculty in 1987, was promoted to full professor this academic year.

Giannelis, who studied for B.S. and Ph.D. degrees in chemistry, specializes in the molecu-

lar design, synthesis, and characterization of new materials such as nanocomposites.

He received the B.S. degree in 1980 from the University of Athens, Greece, and the Ph.D. in 1985 from Michigan State University. Before coming to Cornell, he was a postdoctoral associate at Michigan State, first in the Center for Fundamental Materials Research and then in the Composites Center.

At Cornell, Giannelis has received an award for excellence in teaching. Research conducted by his group is funded by nearly a score of government and industrial organizations.



Giannelis

Sass lectures on use of materials throughout history

Professor Stephen L. Sass opened the 1999 Killiam lecture series at Dalhousie University in Halifax, Nova Scotia, with an evening talk on the breadth and impact of materials on the various ages of history. The talk was based on his recently published book, *The Substance of Civilization*. The Killiam series consisted of three public lectures on the theme "Spirits in the Material World."

Sass also spoke on the use of materials through the ages in a 1999 Cornell lecture series, open to the public, that was offered as part of the interdisciplinary undergraduate course Mind and Memory: Explorations of Creativity in the Arts and Sciences.



Sass

Cambridge professor gives annual Johnson Memorial Lectures

Richard Friend, the Cavendish Professor of Physics at Cambridge University, gave the 1999 Herbert H. Johnson Memorial Lectures at the MS&E department on October 11, 12, and 13. Friend, a specialist in organic optoelectronics, is the inventor of the polymer-based light-emitting diode, considered likely to revolutionize flat panel display technology.

The annual lecture series is named in honor of the late Herbert H. Johnson, who was director of the MS&E department from 1970 to 1974 and then served as director of Cornell's Materials Science Center in its early years. Johnson joined the faculty in 1960 and died in 1989.

At Cambridge, Friend earned the B.A. in 1974 and the Ph.D. in 1979 and joined the faculty after a year at the Laboratoire de Physique des Solides in Orsay, France. He is a co-founder and the director of research and devel-

opment at Cambridge Display Technologies, a start-up company fabricating polymer-based flat panel displays.

Friend's lectures on the three successive days were on electroluminescent polymer diodes, polymer devices, and polymer electronics. During his visit, he met with students, faculty, and Cornell officials, including President Hunter Rawlings and Dean of Engineering John Hopcroft, and with alumni and scientists from local industrial laboratories.

Events included a faculty reception and dinner with Johnson's daughter and son-in-law as guests, and a dinner reception sponsored by the Cornell Center for Materials Research (CCMR). The visit also included tours of the Cornell Nanofabrication Facility (CNF) and the Cornell High Energy Synchrotron Source (CHESS).

As a result of this visit, department director Christopher Ober said, discussions have begun about fostering collaborations between Cambridge and Cornell, possibly including the exchange of students.



Right: Professor Richard Friend during his Cornell visit as speaker in the annual Johnson memorial lecture series.

ALUMNI NOTES

■ **Tom Vonderhaar '75** reports from Fairfield, CA that for several years he has been vice president for sales and marketing at EP Solar, "putting my Materials Science background to good use helping to commercialize photovoltaic power."

In his message he commented on an article in *MS&E News* describing Professor Dieter Ast's research on thin-film solar cells. "Thanks for yet another lesson in MS," he wrote.

He noted that after years of proving its reliability in outer space and "off-grid" terrestrial applications, solar electric power is now becoming practical for urban use. Though still small, the photovoltaics industry is growing rapidly and is expected to provide a significant portion of the world's energy needs within a few decades.

■ When **Shu Yang** receives the ICI Student Award in Applied Polymer Science at the annual meeting of the American Chemical Society in March, it will be presented by her graduate adviser, MS&E Professor Christopher Ober.

Yang, who received the Ph.D. in chemistry in August, won the award for the best paper presented at the ICI (Imperial Chemical Industries) Award Symposium during the national ACS meeting last fall. The paper was titled "Improving Resist



Yang

degree from Fudan University in Shanghai. She is now working at Lucent Technologies' Bell Labs.

■ **Halden Field**, who earned an M.Eng. degree in 1987, is currently president of PV Measurements in Boulder, CO. The company, which he founded last year, provides equipment and advice for measuring the electro-optical characteristics and performance of photovoltaic (solar) cells and modules.

Field developed his interest in photovoltaics during a nontechnical internship after earning the B.S. in electrical engineering at Cornell. Subsequently, as a student in the M.Eng. (Electrical) program, he took an MS&E course in solar energy materials taught by Dieter Ast, and he did his project work for the degree with Ast.

Performance with Block-Copolymer Additives."

The award is administered by a joint committee of two ACS divisions. Ober will present the award as chair of the Polymeric Materials Science and Engineering division.

Yang received the B.S.

✍ Alumni: Please send your news and your email address to: grubb@msc.cornell.edu. Please indicate whether we have permission to list your email address on our Web site.

For a compiled list of addresses, contact: mse-alumni@cornell.edu. That list is also on the department's Web page: www.mse.cornell.edu

✍ A new engineering alumni directory, the first to be published since 1991, may be ordered from BC Harris Publishing Co. by calling 800-877-6554. The directory, a project of the Cornell Society of Engineers, lists all the alumni about whom Cornell has information. The long-range plan is to create an electronic community based on the directory.

Duffield Hall *(continued from page 1)*

Research will be housed in the building. Included in the facility will be clean-room and wet and dry laboratory space, a teaching laboratory, a penthouse area for mechanical equipment, and meeting rooms and offices. A large atrium with greenery, a water feature, and a light food service will connect Duffield, Phillips, and Upson Halls.

The name of the building was chosen in recognition of a \$20 million commitment to the project from David A. Duffield, founder and CEO of PeopleSoft Inc., maker of software for large-scale enterprise resource planning. Duffield holds two Cornell degrees—the B.S. in electrical engineering (1962) and the M.B.A. (1964).

The architectural firm—Zimmer, Gunsul and Frasca—is being advised by three faculty committees on interior and exterior design, user requirements, and safety and facility management. Members from MS&E are Yuri Suzuki, Dieter Ast, and Christopher Ober (User Committee), Stephen Sass (Exterior Design Committee), and Arthur Ruoff (Safety and Management Committee).

The City of Ithaca, which must give approval for construction, will hold a series of public

hearings at which siting and environmental aspects of the project will be discussed.

The project budget has been established at \$53.5 million, and an additional \$3–4 million has been earmarked for a concurrent comprehensive renovation of the Engineering Quadrangle.

The project is in the early stages of design development. This phase should be completed in late winter, and construction documents should be produced by the end of this year.

Read more about the Duffield Hall project on the Web:
www.engineering.cornell.edu/duffield/

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