Nobel Laureate de Gennes to Give Plenary Talk on Soft Matter

Nobel Laureate Pierre-Gilles de Gennes of Collège de France, ESPCI, will present the plenary talk at the 2000 Materials Research Society Fall Meeting in Boston. In his talk, "Soft Matter in Research and Industry," he will describe a research system launched by the French administration consisting of a number of mixed teams between a research agency and an industrial group. He will discuss four research areas related to soft-matter problems: colloids (CEA/Rhone Poulenc); glass interfaces (CNRS/Saint-Gobain); polymers (CNRS/Atochime); and interfaces (CNRS/Rhodia).

From 1955 to 1959, de Gennes was a research engineer at the Atomic Energy Center (Saclay), working mainly on neutron scattering and magnetism. During 1959, he was a postdoctoral visitor at Berkeley, then served in the French Navy before joining the faculty at Orsay, where he started the Orsay group on superconductors. In 1968, he switched to liquid crystals. A few years later, he joined the faculty at the Collège de France, and was a participant of STRASACOL, a joint action of Strasbourg, Saclay, and Collège de France on polymer physics. He also became interested in interfacial problems: the dynamics of wetting and adhesion. More recently, de Gennes has worked on granular materials, artificial muscles, and glass transitions. He has produced over 462 publications.

Among de Gennes' awards and honors are the Holweck Prize (from the joint French and British Physical Society), the Ampère Prize (French Academy of Science), the gold medal from the French CNRS, the Matteuci Medal (Italian Academy), the Harvey prize (Israel), the Wolf Prize (Israel), the Lorentz Medal (Dutch Academy of Arts and Sciences), the 1991 Nobel Prize in Physics, the Heyrowsky medal (Prague), the Onsager medal (Trondheim), the J. Stefan medal (Ljubljana), and polymer awards from both the American Physical Society and the American Chemical Society.

He is a member of the French Academy of Sciences, the Dutch Academy of Arts and Sciences, the Brazilian Academy of Sciences, the Royal Society, the American Academy of Arts and Sciences, and the National Academy of Sciences (USA).

Pierre-Gilles de Gennes

De Gennes will present the plenary address on Monday, November 27, 6:00 p.m., Grand Ballroom, Sheraton Boston.

MRS

George M. Whitesides to Receive 2000 Von Hippel Award for Self-Assembly

The Materials Research Society's highest honor, the Von Hippel Award, this year will be given to George M. Whitesides, Mallinckrodt Professor of Chemistry at Harvard University. He is cited for "bringing fundamental concepts of organic chemistry and biology into materials science and engineering, through his pioneering research on surface modification, self-assembly, and soft lithography." The Von Hippel Award is given annually to an individual in recognition of outstanding contributions to interdisciplinary research on materials.

Whitesides' research has moved organic materials into the forefront of materials science, where it has had a major impact in materials science, chemistry, biology, and many engineering disciplines. A central concern of the Whitesides research group has been to understand the relations between the structure of organic surfaces and their properties, as exemplified by his work in self-assembled monolayers (SAMs) of alkanethiolates on gold. He demonstrated not only that single-atom control was possible, but important in determining the properties of materials. From this discovery emerged the concept of self-assembly in the design and fabrication of materials, the value of simple experimental techniques in guiding exploratory studies in materials science, test systems that calibrate many of the methods now used to characterize organic surfaces, and application in studies requiring tailored surfaces.

George M. Whitesides

Following his work with SAMs, Whitesides is credited with introducing the concept of "self-assembly" into materials science. He has extended the concept of molecular self-assembly to the self-assembly of mesoscale objects. This has led to the fabrication of two- and three-dimensional objects, which is applicable in the area of optical bandgap materials and sensors.

In a series of papers that began seeing publication in 1993, Whitesides introduced soft lithography, a nonphotolithographic system that uses a patterned elastomer to stamp or mold a pattern onto a desired substrate. He initially demonstrated this method by printing SAMs of alkanethiolates on gold using a stamp usually made of poly(dimethylsiloxane) (PDMS). The method of soft lithography has since been extended to the fabrication of microfluidic devices, microelectrochemical synthesis, microelectromechanical systems (MEMS), and composites fabricated with organic materials.

Whitesides' studies of the interaction of cells, proteins, and organic surfaces opened a connection between biology and materials science that depends on the development of inert surfaces, that is, surfaces that do not adsorb proteins. Further understanding of the synthetic/biological interface will benefit medicine, from the development of sensors to prostheses and in-dwelling devices.

Recognized during his career for numerous contributions to science, Whitesides has most recently received the Defense Advanced Research Projects Agency Award for Significant Technical Achievement and the Madison Marshall Award from the American Chemical Society (ACS) in 1996; the National Medal of

Science in 1998; and the Sierra Nevada Distinguished Chemist Award (Sierra Nevada Section of the ACS), the Wallac Oy Innovation Award in High-Throughput Screening (from the Society for Biomolecular Screening), and the Award for Excellence in Surface Science (from the Surfaces in Biomaterials Foundation) in 1999.

He is a member of the American Academy of Arts and Sciences, the National Academy of Sciences, and the American Philosophical Society, and a Fellow of the American Association for the Advancement of Science and the New York Academy of Science. In 2000, he was elected a foreign member of the Indian National Science Academy and chosen as an Honorary Fellow of the Chemical Research Society of India.

Whitesides has served or chaired various advisory boards for the U.S. National Research Council, the National Science Foundation, and the Department of Defense, among others. He was a professor at the Massachusetts Institute of Technology from 1963 to 1982, then joined the Department of Chemistry at Harvard, where he served as chair from 1986 to 1989. He received his AB degree (1960) from Harvard and his PhD degree (1964) from the California Institute of Technology.

Following his acceptance of the Von Hippel Award during the Award Ceremony on Wednesday, November 29, at 6:00 p.m. in the Grand Ballroom, Sheraton Boston, at the 2000 MRS Fall Meeting, Whitesides will present his talk, "Organic Materials Science." His presentation will survey methods of fabrication of organic micro- and nanostructures and their applications. MRS

Anthony G. Evans Selected for 2000 David Turnbull Lectureship for Bringing Insights in Mechanical Behavior to Materials Engineering

The David Turnbull Lectureship recognizes the career of a scientist who has made outstanding contributions to understanding materials phenomena and properties through research, writing, and lecturing, as exemplified by David Turnbull. This year, Anthony G. Evans of Princeton University has been selected to deliver the 2000 Materials Research Society's David Turnbull Lecture. Well known as an excellent lecturer, Evans is cited for "outstanding contributions and leadership in bringing fundamental insights in mechanical behavior to materials engineering through research, teaching, mentoring, writing, and lecturing." His talks have been described as always combining "'the big picture' view while being technically comprehensive." Evans "leaves those listening with a clear understanding of where the field is, what problems are now well under control, and where the big questions still remain."

Anthony G. Evans

Beginning as a metallurgist, Evans studied a broad array of materials as he moved into mechanical behavior. He established fracture mechanics as a key design paradigm in a wide range of brittle materials; established the microstructural basis of materials toughening by means of crack deflection, fiber reinforcement, and transformation toughening; established the materials science behind the fracture, deformation, and delamination of coatings, films, and multilayers; and established test methodologies for evaluating the fracture and thermal/mechanical behavior of materials.

Starting out as part of the scientific staff at the Atomic Energy Research Establishment, Harwell, in the late 1960s, Evans later built the Materials Department at the University of California—Santa Barbara. His publications (over 420 articles) are heavily cited, and he has received many awards and honors, including, most recently, Fellow of the Academy of Arts and Sciences (2000), Distinguished Life Member of the American Ceramic Society (2000), Peterson Award from the Society for Experimental Mechanics (1998), member of the National Academy of Engineering (1997), and the Griffith Medal and Prize of the Institute of Materials in the United Kingdom (1994).

Evans served as chair of DARPA's Defense Science Research Council and a member of the National Materials Advisory Board. He received his BSc (1964) and PhD (1967) degrees in metallurgy from Imperial College, London.

The Turnbull Lectureship award will be presented to Evans at the 2000 MRS Fall Meeting during the Awards Ceremony on Wednesday, November 29, at 6:00 p.m. in the Grand Ballroom, Sheraton Boston. He will present his lecture, "Multifunctional Materials: What are They and What are They Useful For," as part of Symposium X on Thursday, November 30, at 12:05 p.m. in Room 302 of the Hynes Convention Center. MRS

Gruen, Stupp Named 2000 MRS Medalists

The Materials Research Society (MRS) has selected two scientists to receive the 2000 MRS Medal awards, which recognize a specific outstanding recent discovery or advancement that is expected to have a major impact on the progress of any materials-related field. Dieter M. Gruen of Argonne National Laboratory and Samuel I. Stupp of Northwestern University will receive their medals at the 2000 MRS Fall Meeting during the Awards Ceremony on Wednesday, November 29, at 6:00 p.m. in the Grand Ballroom at the Sheraton Boston.

Dieter M. Gruen is named MRS Medalist "for the low-pressure synthesis of nanocrystalline diamond films from fullerene precursors." In 1991, Gruen proposed a method for fabricating diamond films by a chemical vapor deposition (CVD) process in which he avoided contamination by breaking up fullerene molecules in a microwave discharge. This method resulted in the production of the

carbon dimer C_2, a new nucleation and growth species that condenses to form nanocrystalline diamond films.

Gruen's discoveries form the foundations for the development of important technologies such as emissive flat-panel displays; low-friction, low-wear nanocrystalline-diamond microelectromechanical systems (MEMS) devices; and telecommunication applications.

Currently a senior scientist and an associate director of the Materials Science Division at Argonne, Gruen began his seminal contributions to the materials field as part of the Manhattan Project at Oak Ridge National Laboratory, where he joined the team engaged in the large-scale electromagnetic separation of uranium-235. His research interests have since included the coordination chemistry of metal ions in fused salts, the electronic structure of the actinides, the use of metal hydrides as chemical heat pumps, matrix isolation spectroscopy of reactive species, and resonance ionization mass spectrometry of sputtered atoms.

He received BS (1944) and MS (1947) degrees in chemistry from Northwestern University and a PhD degree (1951) in chemical physics from the University of Chicago.

Gruen was a visiting scientist at the Lawrence Berkeley National Laboratory, a delegate to the United Nations Conference on Peaceful Uses of Atomic Energy, and a visiting professor at both the Norwegian Technical University and Hebrew University. He was on the board of the Seaborg Institute for Transactinium Science and on visiting committees for the Lawrence Livermore National Laboratory. He has been on the editorial boards of the *Annual Review of Materials Science*, the *Journal of Applied Physics*, and *Applied Physics Letters*. Gruen is a frequently invited lecturer at national and international conferences and has been the organizer of several conferences and symposia. He has received two U.S. Department of Energy Materials Science Awards, two R&D 100 Awards, a University of Chicago Award for Distinguished Performance at Argonne, and a Merit Award from Northwestern University. The Chicago Patent Law Association honored him with its 1988 Inventor of the Year Award. Gruen is the author or coauthor of more than 350 publications and editor of several books and monographs. He holds approximately 30 U.S. patents.

Gruen will deliver his Medalist talk in Symposium X on Tuesday, November 28, at 12:45 p.m. in Room 302 of the Hynes Convention Center, Boston, on "Ultrananocrystalline Diamond in the Laboratory and in the Cosmos."

Dieter M. Gruen

Samuel I. Stupp

Samuel I. Stupp is named MRS Medalist "for seminal contributions to the development of supramolecular materials that exhibit unique properties resulting from their hierarchical organization in the condensed state." His pioneering work on two-dimensional polymers, initiated with a seminal paper published in *Science* in 1993, has led to his recent discovery of systems in which molecules can be programmed to form highly regular mushroom-shaped nanostructures (*Science* 1997).

Last year, Stupp provided his first example of an organic synthetic polymer with the distinct rigid shape of a nanoobject when he reported, in *Science*, the possibility of covalently stitching the mushroom nanostructures into one single macromolecule without losing the shape formed by supramolecular assembly. Shape-persistent macromolecular objects provide opportunities for rational control of structure-processing-property parameters.

Applications of these self-assembling supramolecular materials are being explored as solid lubricants in MEMS and computers, as anti-icing coatings such as for airplane wings, and as films with two contrasting functions on opposite surfaces as would be useful, for example, in sensors or biomaterials designed for interactions with cells and as scaffolds for tissue engineering.

After receiving his PhD degree (1977) in materials science and engineering from Northwestern University, Stupp joined the faculty, then later became a professor at the University of Illinois at Urbana-Champaign, where in 1996 he was appointed Swanlund Professor of Materials Science and Engineering, Chemistry, and Bioengineering. While at Illinois, he served as chair of the Polymer Division in the Department of Materials Science and Engineering, and has been a member of the Beckman Institute for Advanced Science and Technology since it was founded in 1989. In 1999, he returned to Northwestern University as Board of Trustees Professor of Materials Science, Chemistry, and Medicine.

He has received numerous awards and honors, including the Xerox Faculty Award for Excellence in Engineering Research (1985), the Department of Energy Prize for Outstanding Achievement in Materials Chemistry (1991), Joliot-Curie Professor in Paris (1997), and a Humboldt Senior Award sponsored by the Max Planck Institute for Polymer Science in Mainz, Germany (1997). He was elected Fellow of the American Physical Society (1991) and of the American Association for the Advancement of Science (1999), and is an elected member of the American Academy of Arts and Sciences (1998).

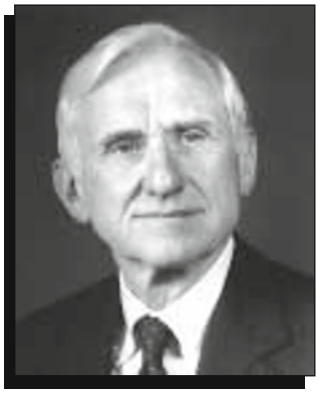
Among various panels and committees on which he has served, Stupp chaired a U.S. National Science Foundation workshop on Interdisciplinary Macromolecular Science and Engineering in 1997 from which a special publication was issued on recommendations for NSF's research directions in this field for the next decade. He is a member of DOE's Basic Energy Sciences Advisory Committee, has served on multiple editorial boards, and has also been an active consultant for major companies.

Stupp will deliver his Medalist talk in Symposium X on Tuesday, November 28, at 12:05 p.m. in Room 302 of the Hynes Convention Center, on "Future Materials and Self-Assemblers." MRS

MRS Gives Award to Flemings at Symposium in His Honor

The Merton C. Flemings Symposium was held at the Massachusetts Institute of Technology in Cambridge on June 28–30, 2000, in celebration of the accomplishments of Merton C. Flemings and to mark his 70th birthday. The Symposium, jointly sponsored by The Minerals, Metals & Materials Society (TMS) and the Department of Materials Science and Engineering (DMSE) at MIT, and endorsed by the Materials Research Society (MRS), was organized "to recognize and acknowledge Merton C. Flemings' contribution to MIT and the materials science and engineering community as an outstanding educator, researcher, technology policy leader, mentor, and friend." Harold D. Brody of the University of Connecticut and Stuart Uram of Certech (retired) co-chaired the Symposium, which nearly 150 of Flemings' former students, friends, and professional colleagues from around the world attended. Presentation topics were selected to "reflect the key contributions of Professor Flemings, his students, and his collaborators in the areas of dendritic solidification dynamics, control of casting quality, interdendritic fluid flow, semi-solid processing, innovative materials processing, and materials science and engineering education."

The Symposium included a celebratory dinner in Flemings' honor at the Boston Museum of Fine Arts, where Yo-Yo Ma, the renowned cellist, performed. During the banquet, MRS Immediate Past President Ron Gibala (University of Michigan) presented Flemings with an award, "In appreciation of a lifetime of contributions to materials science and the materials-science profession." In another highlight of the evening, the DMSE Department Head and R.P. Simmons Professor of Materials Science and Engineering, Subra Suresh, announced a campaign to establish the Merton C. Flemings Endowed Professorship Fund in the DMSE to honor Professor Flemings' 44 years of devoted service to MIT. The Professorship will support a faculty member in the Department of Materials Science and Engineering whose research and teaching are in the broad area of materials engineering and whose academic credentials and service to the profession exemplify the high standards set by Merton C. Flemings.



Merton C. Flemings

Materials Research Society award presented to Mert Flemings at the Merton C. Flemings Symposium, held at the Massachusetts Institute of Technology in Cambridge on June 28–30, 2000.

Suresh, who served as the master of ceremonies for the banquet, said, "The Department of Materials Science and Engineering and MIT have been extraordinarily fortunate to have had Professor Flemings as a student, teacher, mentor, scholar, department head, intellectual leader, and above all, a very devoted citizen of the MIT community, for over five decades."

Institute Professor and Dean of Engineering Thomas L. Magnanti described Professor Flemings' recent activities in Singapore on behalf of MIT and presented him with a gift from the administrators at the National University of Singapore. In 1999, Flemings was appointed co-director of the Center for Singapore–MIT Alliance, a major distance-education and research collaboration among MIT and the two Singaporean universities.

In closing remarks, Flemings described how each decade had brought new challenges and new excitement. He expressed his thanks to his students and his colleagues, and his gratitude to MIT for having been a part of its changing scene for over 50 years.

Flemings received his SB degree from MIT in the Department of Metallurgy in 1951. He received his SM and ScD degrees, also in metallurgy, in 1952 and 1954, respectively. From 1954 to 1956, he was employed as a metallurgist at Abex Corporation in Mahwah, New Jersey, and in 1956 returned to MIT as an assistant professor. He was appointed associate professor in 1961, and rose to the rank of full professor in 1969. In 1970, he was appointed Abex Professor of Metallurgy. In 1975, he became the Ford Professor of Engineering and, in 1981, the Toyota Professor of Materials Processing. He founded the Materials Processing Center at MIT in 1979 and served as its first director until 1982. He was the head of the Department of Materials Science and Engineering from 1982 to 1995, and thereafter returned to full-time teaching and research. He was Visiting Professor at Cambridge University in 1971, at Tokyo University in 1986, and at Ecole des Mines in 1996.

Flemings' research and teaching concentrate on engineering fundamentals of materials processing and on innovation of materials-processing operations. He is active nationally and internationally in strengthening the field of materials science and engineering and in delineation of new directions for the field. He is a member of the National Academy of Engineering and the American Academy of Arts and Sciences. He is author or co-author of 300 papers, 26 patents, and two books in the fields of solidification science and engineering, foundry technology, and materials processing. He has worked closely with industry throughout his professional career and currently serves on a number of corporate and technical advisory boards.

Co-sponsoring societies of this event were Société Française de Métallurgie et de Matériaux, the Japan Institute of Metals, ASM International, the Iron and Steel Institute of Japan, and the Korean Institute of Metals and Materials. MRS