ACS 1986 Award Winners

This is the fourth in a series of vignettes of recipients of awards administered by ACS. They will receive their awards during the April 1986 191st ACS National Meeting in New York City. The awards will be presented during an awards banquet, at which time Karl A. Folkers will give the Priestley Medal Address. Vignettes of the remaining awardees will appear next week.

ACS Award in Colloid & Surface Chemistry

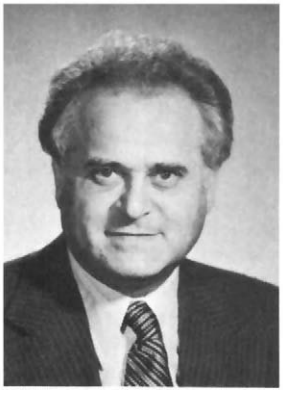
sponsored by Kendall Co.

ELI RUCKENSTEIN, Distinguished Professor in the State University of New York, Buffalo's chemical engineering department, was born in Botosani, Romania. He received a degree in chemical engineering in 1949 and a doctorate in engineering in 1966 from the Polytechnic Institute, Bucharest. He taught at the institute and at the University of Delaware before joining the SUNY, Buffalo, faculty.

The striking aspect of Ruckenstein's work, a colleague remarks, is the breadth of his interest and the originality and importance of his basic and applied work, which includes such different areas as metal-support interactions in catalysis, kinetics of the selectivity of the catalytic processes, catalyst poisoning, thermodynamics of surfactant aggregation and of microemulsions, dynamics of wetting, deposition of Brownian particles and cells, hydration forces, double-layer forces, electrokinetic phenomena in enzymic reactions, and protein separation.

His work is interdisciplinary, applying fundamental theoretical aspects of colloid and surface chemistry to the solution of problems in diverse areas. For example, Ruckenstein's exploration of the physicochemical interactions of surfaces with their surrounding media as well as of the forces between colloidal particles has enabled him to identify: (1) suitable conditions for the design of supported metal catalysts and of biocompatible surfaces and (2) novel methods for protein separation. He was also the first to explain the origin of the thermodynamic stability of microemulsions encountered in tertiary oil recovery. His treatment of the sintering of the supported metal catalysts, with emphasis on the role of the metal-support interactions and of wetting, has led to vigorous research in this area.

Ruckenstein received three national awards in Romania, including the Romanian Academy of Sciences' Award for Research in Surface Phenomena. He also received the Alpha Chi Sigma Award of the American Institute of Chemical Engineers in 1977 and the Senior Humboldt Award of the Alexander von Humboldt Foundation this year. He has published more than 400 papers on research. Many of his former students, who now are employed in both industry and in academia, are active researchers in various areas of colloid and surface science.



Ruckenstein

Shakhashiri

Sinfelt

ACS Award in Chemical Education

sponsored by Union Carbide Corp.

"An unusual educator who is having an impact at many levels of chemical education," are the words one colleague uses to describe **BASSAM Z. SHAKHASHIRI.** He is "a strong proponent of the proposition that the faculties of our academic institutions can excel as teachers of chemistry as well as researchers in chemistry," comments another admirer of this awardee. At present, Shakhashiri is the National Science Foundation assistant director for Science & Engineering Education.

Before he began work for the National Science Foundation in June of 1984, Shakhashiri was professor of chemistry at the University of Wisconsin, Madison. During his time there, his important accomplishments in the field of chemical education were numerous. He established and was the first director of the Institute for Chemical Education. The goals of this institute, which is national in scope, are to serve educators in the chemical sciences at all educational levels by strengthening the links between the chemical sciences and related disciplines and technologies, to apply new techniques to chemistry education, and to provide a national center for addressing critical issues.

In addition, he and his collaborators published in 1983 the first volume of "Chemical Demonstrations: a Handbook for Teachers of Chemistry," an essential resource for college and high school chemistry

teachers. In 1982 Shakhashiri originated the "Chemistry Can Be Fun" program for the middle schools in Madison and the surrounding area. This offers lecture demonstrations and a weekend hands-on program for students, and a parallel in-service course for teachers. Beginning in 1981, Shakhashiri served as special consultant to the Chicago Museum of Science & Industry. In this role he and his associates developed an interactive exhibit of chemical phenomena, the first of its kind in the U.S., which became an instant success.

Born in Lebanon in 1939, Shakhashiri obtained his B.A. degree from Boston University, and his M.S. and Ph.D. degrees from the University of Maryland. He was the Chairman of the ACS Division of Chemical Education during 1981, and in 1983, he was the youngest person ever to receive the James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry.

E. V. Murphree Award in Industrial & Engineering Chemistry

sponsored by Exxon Research & Engineering Co.

"A world-renowned pioneer in the science and technology of catalysis, **JOHN H. SINFELT** has spearheaded the systematic development of an understanding of the mechanism by which many heterogeneous, dispersed-metal catalysts work and has transferred this fundamental knowledge into commercial reality." This is the way one colleague sums up the many accomplishments of Sinfelt, senior scientific adviser at Exxon Research & Engineering Co.

After receiving his B.S. degree from Pennsylvania State University in 1951 and his M.S. (1953) and Ph.D. (1954) from the University of Illinois, Sinfelt began working at Exxon.

In the early 1960s, he initiated a fundamental research program on bimetallic catalysts. An important part of this research was the development of the concept of the bimetallic cluster. This in turn led to the development of a platinum-iridium catalyst that was first applied commercially in 1971 to the reforming of petroleum naptha fractions. In the reforming process, saturated hydrocarbons in the naptha fraction are converted to aromatic hydrocarbons. The platinum-iridium catalyst was several times more active in this process than the previously used platinum catalyst and maintained its activity over much longer periods of time.

In the years since its first commercial application in 1971, the platinum-iridium catalyst has been used in many reforming units for the economical conversion of naptha into high-octane, low-polluting gasoline requiring little or no lead antiknock additives. Thus, it has played a vital role in the development of unleaded gasoline. Catalysts designed by Sinfelt and his associates over the years are now in use in refineries and chemical plants all over the world for hydrocarbon reforming, isomerization, hydrogenation, and aromatization.

Sinfelt's research has also contributed to an understanding of heterogeneous metal catalysis at the molecular level. He and collaborators applied extended x-ray absorption fine structure analysis as a tool for examining catalyst structures too small to be studied by x-ray diffraction.

A member of the National Academy of Sciences and the National Academy of Engineering, in recent years he has been honored with a number of other prestigious awards, including the National Medal of Science in 1979 and the Perkin Medal of the Society of Chemical Industry in 1984.

Joel Henry Hildebrand Award in the Theoretical and Experimental Chemistry of Liquids

sponsored by Shell Companies Foundation Inc.

FRANK H. STILLINGER "was the first, and has become internationally the foremost, theoretical chemist to undertake systematic studies of liquid water at the molecular level," states a colleague of the awardee in summarizing his accomplishments. Stillinger is a member of technical staff in the chemical physics research department at AT&T Bell Laboratories.

Stillinger's pioneering work began with his study of the quantum mechanics of the water molecule, dimers, trimers, etc. This work led to the invention of an effective pair potential, the "ST2" potential, which is still held as the most reliable molecular interaction function for describing molecular behavior in the condensed phases of water. He used this function to carry out molecular dynamics simulations for liquid and solid forms of water at a variety of temperatures and pressures, successfully theoretically reproducing the anomalous properties of water. Then he focused on the nature of hydrogen-bond order in liquid water and its solutions.

The award winner introduced the polarization model to examine the process of water molecule ionization to form hydrogen and hydroxyl ions. These studies have given statistical mechanical theory access for the first time to dynamics of the chemically important proton transfer reactions in solution.

Stillinger

Viola

Weisz

He also has made important fundamental contributions to the theory of electrolytes, provided exactly solvable statistical mechanical models, and described basic aspects of capillary wave phenomena. In more recent research, he has developed a general theory of hidden structures for condensed phases of matter.

Stillinger received his B.S. from the University of Rochester in 1955, his Ph.D. from Yale University in 1958, both in chemistry. He remained at Yale as a postdoctoral fellow until 1959, when he joined AT&T Bell Labs. In 1978 he was awarded the Eliott Cresson Medal of the Franklin Institute for his research on the molecular nature of liquid water and aqueous solutions. In 1984 he was elected to the National Academy of Sciences. He has more than 140 publications to his credit.

ACS Award for Nuclear Chemistry

sponsored by Amersham Corp.

For many years, **VICTOR E. VIOLA JR.**'s research has focused on linear momentum transfer in nucleus-nucleus collisons, work that is now receiving wide recognition. Viola is professor in the department of chemistry at Indiana University.

In his studies, Viola has elucidated the mechanisms that characterize collisions between complex nuclei and the nuclear fission process. For instance, his research contributed to the discovery of new reactions, called strongly damped collisions, that dominate the interaction between very heavy nuclei.

Viola's work on the origin of the chemical elements has shed light on nucleosynthesis processes in cosmic rays and supernovae. His current results relevant to the origin of the elements Li, Be, and B are consistent with a universe that is open and will expand forever.

For the past decade Viola and his group have been studying the evolution of nuclear reaction mechanisms in the intermediate energy region between the low-energy mean-field and high-energy nucleon-nucleon limits.

Following graduation from the University of California, Berkeley, with a Ph.D. in 1961, the award winner was an instructor at the university and a postdoctoral fellow at Lawrence Berkeley Laboratory. He was visiting postdoctoral fellow at Centre Européene pour la Recherche Nucleaire during 1963–64. He then joined Argonne National Laboratory as research associate. He moved to the University of Maryland as assistant professor of chemistry in 1966, became associate professor in 1968, and professor in 1974. He came to Indiana as professor in 1980.

Viola has received numerous fellowships, including a 1980–81 Guggenheim Fellowship. He has been heavily involved in professional organizations and other activities. Still he has maintained a very active research program through the Indiana University Cyclotron Facility as well as the LBL HILAC and Michigan State University cyclotron.

ACS Award in the Chemistry of Contemporary Technological Problems

sponsored by Mobay Chemical Corp.

PAUL B. WEISZ has made major contributions to the advance of industrial and engineering chemistry and to catalytic science and its applications during his many years at Mobil Research & Development Corp. He is now Distinguished Professor of Chemical and Bioengineering Science in the department of chemical engineering at the University of Pennsylvania.

Weisz' research in catalysis and diffusion phenomena has directly influenced much of today's chemical process technology. He demonstrated how diffusion phenomena will influence the behavior of catalysis both in chemical practice and in nature.

His pioneering work with zeolites demonstrated their abilities to perform catalysis in their intracrystalline space, and to perform uniquely molecular shape-selective conversions. Today more than 90% of catalytic cracking employs zeolite catalysts, and many shape-selective processes are operating worldwide in the petroleum and petrochemical industry. Examples are dewaxing processes to produce more diesel fuel and lubricants, and highly efficient xylene isomerization processes.

Born in Czechoslovakia, Weisz studied physics at the Humboldt University in Berlin. His studies were interrupted by World War II and emigration to the U.S. He obtained a B.S. in physics from Auburn University in 1939 and a D.Sc. in chemical technology from the Swiss Federal Institute of Technology, Zurich, in 1965. He became a U.S. citizen in 1946.

He began his research career at the Institute for Cosmic Radiation Research in Berlin, and continued it at the Bartol Research Foundation (Swarthmore, Pa.) in wartime service as a civilian scientist at Bartol and at Masschusetts Institute of Technology's radiation laboratory. In 1946 he joined the research staff at Socony-Vacuum Oil (now Mobil Oil), where he rose to senior scientist, served as manager of its central research laboratory, and later as science adviser of Mobil Research & Development Corp. He came to the University of Pennsylvania in 1984.

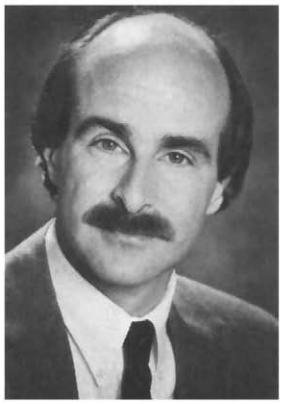
The award winner has received numerous honors and awards. He was the 1985 recipient of the Society of Chemical Industry's Perkin Medal. He has authored more than 130 papers and is named an inventor on some 70 U.S. and many more foreign patents.

Nobel Laureate Signature Award for Graduate Education in Chemistry

sponsored by J. T. Baker Chemical Co.

Three Cornell University physical chemists will receive the 1986 Nobel Laureate Signature Award. The award honors the Ph.D. thesis research of **ROBERT L. WHETTEN**, now assistant professor at the University of California, Los Angeles, which was sponsored and directed by Cornell professor **EDWARD R. GRANT** in collaboration with theoretical physical chemist **GREGORY S. EZRA.**

Whetten



Grant

Ezra

The thesis addresses the question of how to comprehend molecules for cases in which the forces between atoms cannot be described in terms of conventional ball-and-spring models because the electronic states from which the forces derive fail to adjust smoothly ("adiabatically") to internuclear vibrations. This notoriously difficult problem arises to some extent in all molecules and chemical reactions, and the development of a unified view of adiabatic and nonadiabatic molecular dynamics is regarded by one expert as "one of the outstanding challenges in the molecular sciences."

Initially, Whetten and Grant applied and developed new techniques combining ultraviolet lasers and pulsed gas jets to obtain highly resolved nonlinear optical spectra of supercooled molecules. The particular states, those occurring in Rydberg and dynamical Jahn-Teller systems, were chosen because they offer cases for which the electronic response to vibrational motion is notably sluggish, and the results allowed some of the most precise tests to date of formally exact quantum theories of this nonadiabaticity or sluggish response.

To gain a fuller understanding of these and other nonadiabatic systems, the Cornell group took the problem beyond formal stationary state treatments to a dynamical viewpoint. This was accomplished for the Jahn-Teller system by constructing a self-consistent semiclassical theory. The results of this approach show directly how the distinct nature of nonadiabatic coupling between nuclear and electronic degrees of freedom derives from the dynamics of certain slow but general characteristics of molecular electronic wave functions. In recent work this classical analog approach to nonadiabatic dynamics has received strong support from successful efforts by Cornell graduate student Josef Zwanziger and the awardees to semiclassically quantize this system. Most revealing, however, is a general principle derived from this analysis placing limits on the degree of sluggishness or nonadiabaticity a molecule can experience. This unexpected result has an intuitive appeal likely to bring together the conceptual frameworks of nonadiabatic and adiabatic molecular dynamics.

The thesis work is regarded by one appraiser as "a remarkable accomplishment, a unique combination of theory and experiment, unified by an incisive analysis of an important problem." Another notes that "Whetten has taught himself to move within the wide spectrum of approximations [in molecular physics and spectroscopy] like few scientists anywhere, and what is most significant, to recognize in complicated experimental results exactly the appropriate level of interpretation."

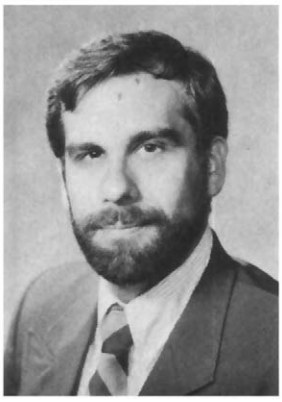
Whetten, who was the recipient of three awards for outstanding scholarship at Weber State College, began graduate work at Cornell in 1980. In May 1982 he received his M.S. and began doctoral research, supported by an NSF predoctoral fellowship, on the nonlinear laser spectroscopy of nonadiabatic molecular systems. He received his Ph.D. in May 1984, and was a postdoctoral fellow at Exxon Research & Engineering before accepting his present position. Grant, presently an associate professor of chemistry at Cornell, received his B.A. and Ph.D. from Occidental College and the University of California, Davis, respectively. He has current research programs in state-to-state photofragmentation dynamics, spectroscopy of fluxional molecules, and transient studies of homogeneous organometallic catalysis. Ezra, a Cornell assistant professor, received his B.A. and Ph.D. from Oxford University, and has research interests in the symmetry properties and dynamics of nonrigid molecules and in nonadiabatic processes in bound states and collisions.

ACS Award in Pure Chemistry

sponsored by Alpha Chi Sigma Fraternity

PETER G. WOLYNES' research has focused on the interplay between chemical dynamics and many body phenomena, highlighting the role of the molecular environment in the rates of chemical reactions. His work leading to a molecular theory of ionic mobility was the first microscopic calculation of a transport property of a fluid with strong electrical forces.

In other work, the University of Illinois chemistry professor showed how one can interface modern liquid-state theory with the path integral formulation of quantum mechanics. Wolynes has made important and seminal contributions in the dynamics and mobility of molecules in complex liquids, rates and mechanisms of reactions in solution, and quantum dynamics in the liquid state.



Wolynes

He also introduced new path integral quadratures that make computer simulation of quantum systems more feasible, and advanced the understanding of tunneling in condensed phases. His current work is on the thermodynamics and structure of glass. A colleague notes: "Wolynes has an uncanny instinct for finding problems that are important and manageable, and a remarkable ability to take a fresh point of view."

Wolynes received his B.A. (with honors) from Indiana University in 1971, his M.A. in chemistry in 1972 and Ph.D. in chemical physics from Harvard University in 1976. He taught at Harvard and, following postdoctoral work at Massachusetts Institute of Technology, he joined the University of Illinois, Urbana-Champaign, faculty in 1980. He has authored or coauthored more than 50 papers and has lectured extensively.

He is a member of the American Chemical Society, American Physical Society, American Association for the Advancement of Science, and the Illinois Alliance to Prevent Nuclear War. □

Additional awards

Michael J. **Betenbaugh**, of the University of Delaware, and Michael P. **Thien**, of Massachusetts Institute of Technology, have received the William H. Patterson awards. The awards were given by the ACS Division of Microbial & Biochemical Technology for outstanding student papers presented at the national meeting in Chicago.

George B. **Butler**, director of the Center of Macromolecular Science & Engineering at the University of Florida, has received the Southern Chemist Award for 1985. The award was presented to Butler on Oct. 10 during the ACS Joint Southeast/Southwest Regional Meeting in Memphis. Butler joined the faculty at the University of Florida in 1946. He has authored more than 230 research publications or patents.

Susan S. **Collier** and James R. **Frederick** have been honored by the ACS Rochester Section for their many contributions to the section. Both Collier and Frederick have been very active in the Rochester Section serving on numerous committees over a long period of time. Collier is a senior staff member at Eastman Kodak Research Laboratories; Frederick is retired (in 1984) from Kodak's patent department.

Anthony P. **Malinauskas**, a physical chemist at the Department of Energy's Oak Ridge National Laboratory; William H. **Miller**, physical chemist at the University of California, Berkeley; and Betsy M. **Sutherland**, biochemist at Brookhaven National Laboratory, Albuquerque, are among six recipients of the 1985 Ernest Orlando Lawrence Memorial Award for outstanding contributions in the field of atomic energy. The awards are given to U.S. citizens who are at a relatively early stage in their careers and who have made recent meritorious contributions to the development, use, or control of atomic energy. Each awardee will receive a citation, medal, and $10,000 prize. The awards will be presented by DOE Secretary John S. Harington at a special ceremony in Washington, D.C., Nov. 25.

Colin F. **Poole**, chemistry professor at Wayne State University, Detroit, has received the Tsweet Chromatography Medal. Poole and two other scientists—John H. **Knox** of the U.K., and Karel **Macek** of Czechoslovakia—received the international award in Oslo, Norway. Poole was cited for: expertise in high-performance, thin-layer chromatography; a derivation of a technique for trace analysis; and the development of polar stationary phases.

Richard N. **Zare** of Stanford University will receive the 41st Harrison Howe Award of the ACS Rochester Section. The award honors Zare for his development of laser-based methods for probing a wide range of chemical problems. Zare's laser-induced-fluorescence technique is now a standard method in labs around the world. An award banquet and Zare's address will be held at the University of Rochester on Nov. 11. For more information and reservations, contact James Rosamond, telephone (716) 475-9000, Ext. 542. □

Calls for nominations

The ACS History Division and Dexter Chemical Corp. are soliciting nominations for the **1986 Dexter Award.** The award honors outstanding accomplishment in the history of chemistry, and consists of $1000 and an engraved plaque. The nomination should include a cover letter assessing the contributions of the nominee, vita, and bibliography of publications. Copies of no more than three select publications may also be included if available. The documents should be sent to Robert H. Goldsmith, Division of Natural Science, Anne Arundel Hall 201A, St. Mary's College of Maryland, St. Mary's City, Md. 20686. *The deadline for nominations is Jan. 1, 1986.*

Nominees for the **Award for Advancement of Agriculture & Food Chemistry** are being solicited. The award consists of $2000, a certificate, and an allowance to cover travel expenses of the awardee to the meeting at which the award is presented. The nominee must have made an outstanding application of chemistry and/or chemical technology to the solution of agricultural or food problems of importance to the nourishment and health of mankind, or an outstanding contribution to the advancement of pure and/or applied agricultural and food chemistry. Nomination forms and additional information are available from Benny E. Knuckles, Western Regional Research Center, 800 Buchanan St., Albany, Calif. 94710, telephone (415) 486-3788. *The deadline for nominations is Jan. 1, 1986.*

All ACS members are invited by the Committee on Patents & Related Matters (CP&RM) to suggest possible candidates for nomination for the **National Technology Medal.** Recently funded by the Department of Commerce and established by the Stevenson-Wydler Innovation Act of 1980, the medal is awarded annually by the President. It may be awarded to individuals, groups, companies, or to institutions within the U.S. for outstanding contributions to technology or for the promotion of the technological workforce. Nomination documents may be obtained by contacting Nancy Mullens (202) 872-4479. *The deadline for nominations is Jan. 1, 1986.*

The ACS Central Wisconsin Section in conjunction with Zimpro Inc. is seeking nominations for the **F. J. Zimmermann Award in Environmental Science.** The award, consisting of $1000 and a plaque, is given annually to an individual whose research has had a significant impact on environmental protection. The award announcement and presentation will be made at the 20th Great Lakes Regional Meeting to be held June 2–4, 1986, at Marquette University, Milwaukee. The award recipient will be invited to present an overview of the scientific contributions upon which the award is based. Any scientist residing in the U.S. is eligible for the award. Nomination forms are available from L. A. Ochrymowycz, Department of Chemistry, University of Wisconsin, Eau Claire, Wis. 54701. *Nomination forms and supporting documents must be received no later than Feb. 1, 1986.* □