

Fellows Turn Physics into Technology

Every year, the American Physical Society bestows the title Fellow on a select group of its members who have made extraordinary contributions to physics, whether in academia, industry, or government. Nominations for this coveted award come from each APS division, forum, and topical group. This year, nine members of the Forum on Industrial and Applied Physics (FIAP) received the distinction of being named APS Fellows (see box). Among those honored is Abbas Ourmazd, without whom, one colleague wrote, "FIAP would not exist today."

The scientific contributions of the new Fellows range widely across the cutting-edge

technologies that are shaping modern society. They include key work in developing the 64-Mb DRAM (dynamic random access memory); technology now used in advanced automatic teller machines (ATMs); innovative applications of theoretical physics that improved the efficiency of a commercial cesium-beam atomic clock; and contributions to the fields of organic conductors and high-temperature superconductors.

Many of the new Fellows have developed strong management skills to accompany their scientific and technical expertise and the ability to translate basic work into industrial applications. Consider, for example,

Randall D. Isaac, vice president for systems, technology, and science at IBM's Thomas J. Watson Research Center in Yorktown Heights, New York.

Early in his IBM career, Isaac, widely known as Randy, made significant contributions to the early development of advanced bipolar technology, a major underpinning of today's high-end mainframe computers. He later served as program manager of the joint IBM/Siemens project that developed the 64-Mb DRAM, a position in which he navigated many pitfalls in successfully selecting and developing the technology needed for perfecting the device. Currently, Isaac has worldwide responsibility for the IBM research division's strategy in semiconductors, packaging, and display technologies.

"Like many experts in device physics, Randy has a desire to see his insights translated into significant practical applications," says John A. Armstrong, now chairman of the American Institute of Physics, who had been vice president for science and technology at IBM. "But unlike most, he has not only helped to translate insight into impact, but has gone on to become a key leader in the development of semiconductor technology in the U.S. and abroad."

A keen understanding of the close relationship between science and technology often characterizes the successful industrial physicist, as it does APS Fellow Paul Michael Grant. At IBM's Almaden Research Center in San Jose, California, Grant made major contributions to the understanding of organic conductors and high-temperature superconductors and offered insights into their potential applications. In 1993, he joined the Electric Power Research Institute (EPRI) in Palo Alto, California, as executive scientist. His duties include responsibility for EPRI's high-temperature superconducting power applications program. "Paul has the unusual talent to recognize the importance of certain materials and, even more important, to go ahead and discover novel phenomena and unravel their mysteries," says C. W. Chu of the Texas Center for Superconductivity at the University of Houston.

New Fellows and Their Fellowship Citations

Joseph J. Barrett

Allied Signal

For his pioneering contributions in the development and applications of new Raman and infrared techniques and, in particular, photoacoustic Raman spectroscopy for gas analysis and infrared sensors for avionics applications.

Paul M. Grant

Electric Power Research Institute

For contributions to the fields of organic conductors and high-temperature superconductivity.

Lawrence David Jackel

AT&T Bell Laboratories

For sustained contributions to the fields of microscience and machine learning by increasing scientific understanding and by developing technology and applying it to systems with commercial and industrial significance.

Abbas Ourmazd

Institute for Semiconductor Physics

For work on the characterization of semiconductor interfaces, the development of fast transistors, and service to the APS via his role in founding the Forum on Industrial and Applied Physics.

Tak H. Ning

IBM Thomas J. Watson Research Center

For outstanding contributions to the understanding of hot electron effects in metal-oxide-semiconductor field-effect transistor devices, and advances in bipolar technology.

Richard L. Sutherland

SAIC

For his contributions to the understanding and application of nonlinear optical materials and switchable volumetric holograms.

Curt A. Flory

Hewlett-Packard Laboratories

For the imaginative use of theoretical physics in the analysis and creation of precision frequency standards, microwave sources, acoustic signal processing and sensing devices, and mass spectrometry instrumentation.

Randall Duane Isaac

IBM Thomas J. Watson Research Center

For outstanding contributions to advanced bipolar technology and 64-Mb dynamic random access memory development.

Gregory W. Swift

Los Alamos National Laboratory

For pivotal experiments leading to a new understanding of the superfluid state and for the development of thermoacoustic engines.

Another common characteristic of the Fellows is the insight needed to apply physics outside the traditional settings of physics. Lawrence David Jackel has spent his career at AT&T Bell Labs working at the interface between basic science and commercially significant technology. In the early 1980s, he and several colleagues built sophisticated microfabrication tools that served as part of the foundation for today's submicron semiconductor processing. As a department head, he built Bell Labs' neural-networks and machine-learning efforts into the strongest in industry. Jackel and R. E. Howard, working with a team led by C. E. Stenard, went on to develop accurate recognition systems for handwritten and poorly printed documents. Their technology is now being deployed in character-recognition-enabled ATMs, in high-speed check-processing systems, and in FAX-based product-registration systems.


"Jackel exemplifies an exceptional physicist of superb agility, who has made outstanding contributions to physics and then to the application of physics in industry,"

says Abbas Ourmazd, now scientific director of the Institute for Semiconductor Physics in Frankfurt, Germany.

Ourmazd himself was named a Fellow for his work in semiconductors and the development of fast transistors, as well as for his role in founding FIAP. While at Bell Labs, Ourmazd served as vice-chair and later chair of APS's Committee on Applications of Physics. He played a key role in formulating the charter for FIAP and in winning its acceptance by APS. "I think that it is fair to say that without Dr. Ourmazd's persistence and leadership, FIAP would not exist today, and that his contributions in this regard have brought singular benefits to the members and management of APS," writes Charles B. Duke of the Xerox Wilson Center for Research and Technology in Webster, New York.

Ourmazd was also recognized for research that has advanced the state of microelectronics, including his fundamental work on diffusion, which led to the concept of vertical doping engineering, and his pioneering work in low-power electronics. "Dr. Ourmazd's

work on the fundamental thermodynamic properties of point defects in compound semiconductors provides some of the key parameters and models needed for controlling diffusion in compound semiconductors, particularly in inhomogeneous device structures," Duke notes. "His views on the future of silicon technology are widely sought, both in the United States and Europe."

Nomination forms and additional information on the awards can be obtained by writing to the APS Fellowship Office (One Physics Ellipse, College Park, MD 20740-3844); by e-mailing fellowship@aps.org; by telephoning (301) 209-3268 or faxing (301) 209-0865; or by downloading an electronic version of the nomination form from the Society's Web site (www.aps.org). 

The Forum department is initiated by the American Physical Society's Forum on Industrial and Applied Physics (FIAP). For further information on FIAP, please contact the chairperson, John M. Rowell (jmrberkhts@aol.com).