

Johann Peter Krusius

February 4, 1944 — January 30, 2003

Professor Johann Peter Krusius died of cancer at age 58 on January 30, 2003 in Ithaca, New York. Peter graduated with honors in 1964 from the School of Reserve Officers, Finnish Defense Forces and entered the Helsinki University of Technology in Finland. He received the Diploma Engineer degree in Electrical Engineering in 1969 with distinction, the Licentiate of Technology degree in 1972, and the Ph.D. degree in 1975 (both in Electron Physics). Following receipt of his doctorate, he did research on semiconductor physics for two years at the University of Dortmund (West Germany) Institute of Physics, and from 1977-79 as a Docent of Technology at the Helsinki University of Technology Electron Physics Laboratory. Peter came to Cornell as a Fulbright Fellow in the School of Electrical Engineering and the National Submicron Facility in 1979, remained as a Research Associate, was appointed an Associate Professor in 1981, and was promoted to full Professor in 1987.

Upon his appointment to professorial rank, Peter began a remarkable career of productive research and publication, excellent instruction, and outstanding technical leadership in his fields of semiconductor electronics and microelectronics. In 1986, he was appointed Associate Director of the Joint Services Electronics Program (JSEP) at Cornell, a multi-university basic-research program supported by the U.S. Army, Navy, and Air Force. Also in that year, Peter served as Associate Director of a related activity, the Industrial Affiliates Program of the National Submicron Facility. During the early years of JSEP, principal attention had been given to high-speed microwave devices, but recent emphasis had shifted to optoelectronics. Following a sabbatical year at the IBM T.J. Watson Research Center in 1988-89, Peter became Director of JSEP and together with three EE faculty members started a new three-year research program on the fundamentals of speed limits of optoelectronic devices. By that time, his research interests had begun to focus on ultra-high-density nanoelectronics, femtosecond carrier processes in semiconductor heterostructures, and integration and packaging of high-speed computers from individual circuits on a chip to full systems. In September 1990, Peter cooperated with Professor Che-Yu Li, of the Department of Materials Science and Engineering, to establish the Industry-Cornell University Alliance for Electronic Packaging. On a sabbatical leave during the spring 1995 term, Peter was a Visiting Professor at the Royal Institute of Technology (KTH) in Stockholm, Sweden, where he offered a special course and conducted collaborative research at KTH with circuit and system designers on system integration and system packaging for digital computing and telecommunication applications. In 1997, he became Director of the Cornell University

Electronic Packaging Program, following Professor Li's tenure in that office, and established the Cornell Advanced Facility for Electronic Packaging.

Peter described electronic packaging research as being concerned with attempts to bridge the gap between the largest component and the smallest component in an electronic system. Since a typical circuit with an electronic chip is a highly complex array with hundreds, perhaps thousands, of interconnections from the outside world to the tiny elements within the chip, an effective electronic package requires design of novel connection procedures, development of new materials, and avoidance of electrical interactions between closely positioned elements. Peter predicted that future conduct of electron packaging research in the new state-of-the-art clean-room facilities planned for Duffield Hall would allow his research group to reach system-level device counts comparable to the number of neurons in the human brain.

From 1998–99, Peter served as Director of the Semiconductor Research Corporation (SRC) Interdisciplinary Program on Microscience and Technology at Cornell, and continued as Director of the Electronic Packaging Facility in a three-year program to construct a unique tool that could fabricate over 5000 connections to integrated circuit chips. In this period, Peter joined with Professor Joseph M. Ballantyne in an effort to establish, as part of a consortium of seven universities, an ambitious national semiconductor research effort known as the Focus Center Research Program, with an ultimate goal to develop a new generation of more powerful computer chips by devising new methods to interconnect microchip components. While this program was won by another consortium, it forged useful interactions with other universities in future joint efforts.

Attention to electronic packaging concepts over the years led Peter and his colleagues to invent an important new flat-screen television and video technology. He established a research group that designed and developed techniques for joining color flat-panel television and video screens to make large active matrix liquid crystal displays made up of three panels tiled together into a single, seamless piece of glass. In 1996, he helped found Rainbow Display Inc. (RDI), a Cornell startup company created to build the displays. In 1999, RDI signed a joint development agreement with Philips Flat Display Systems, a unit of Royal Philips Electronics of the Netherlands, one of the world's largest consumer electronics companies. Last year, the display technology won the Society for Information Display magazine's Display of the Year Gold Award, their highest honor.

The major portion of Peter's 23-year academic career at Cornell was devoted to teaching juniors, seniors, and graduate students in semiconductor electronics, microfabrication, and physical design of computer packaging. He supervised the thesis research of over 30 Ph.D. students in these areas and guided more than 100 Master of

Engineering students through design projects related to his active research program. Initially, he taught courses EE 435-36, Semiconductor Electronics I and II, and later developed a new version of the junior-level course, EE 315, Electronic Circuit Design, that was offered for the first time in the 1995 Fall term. That course was notable for its imaginative projects that required the students to design, build, and test control circuitry in a three-week period. Peter made major contributions to the curriculum with the popular course EE/ECE 536, Microfabrication, taken by hundreds of students through the years, and EE/ECE 537, Physical Design of High-Speed Computers. Recently he developed a 300-level version of the latter course (ECE 336) that is being offered for the first time this year, but was disappointed that his health prevented him from participating in the new course.

Peter brought to the classroom the same dedication, attention to detail, and thorough preparation that he applied to his research activities. He was greatly admired by his students who appreciated his highly organized course web page, clearly delivered lectures, and sometimes-unique approach to examinations. He was generous with his office hours and his consultation time with students and always made certain that all questions were answered, even if he remained overtime. He was a particularly conscientious class advisor, and always attended meetings of the ECE Faculty Committee to ensure his proper attention to academic actions that might relate to his advisees. Peter served on the ECE Curriculum and Standards Committee, and was a member of a committee to study the Master of Engineering Program in the College.

Peter was a prolific contributor to the literature in his field. He authored or coauthored over 250 publications in technical journals and over 150 conference presentations, wrote over 25 invention disclosures or patent applications, won a number of outstanding paper awards, and served as editor-in-chief of the *IEEE Transactions on Components, Packaging, and Manufacturing Technology--Advanced Packaging*. He was the author of a chapter entitled, "Fundamental Limits for Electronic Packaging," in the textbook, *Fundamentals of Electronic Packaging*, by Donald P. Seraphin, Ronald Laskey, and Che-Yu Li, published by McGraw-Hill in 1987. Peter was a senior member of the IEEE and a member of the American Physical Society, the Materials Research Society, the Electrochemical Society, and the American Association of Science. Despite his busy schedule of teaching, research and business affairs, Peter was an avid skier and windsurfer and enjoyed Bach and other classical music, science fiction, gadgets, home repairs, and automobile maintenance.

Peter Krusius's cheerful presence, keen research initiative, and technical expertise will be greatly missed. He will be long remembered as a devoted teacher and advisor, a dedicated scholar, a respected colleague, and a good friend.

Peter and Eeva Kuokkanen were married in 1969 in Helsinki, Finland. Following ten years in Helsinki, which

included two years in Dortmund, Germany, they moved to Ithaca, New York where they spent the last 23 years of their 33 years of life together. Peter is survived by his wife, Eeva, of Ithaca, New York; his sons, Paul, of Boston, Massachusetts; Otto, of Boston, Massachusetts (both Cornell graduates); and Leo, a Cornell undergraduate student, of Ithaca, New York; and his extended family in Finland and Germany.

Joseph M. Ballantyne, Dieter Ast, Clifford R. Pollock