

1999

The Charles Stark Draper Prize

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The Charles Stark Draper Prize was established in 1988 to honor the memory of Dr. Charles Stark Draper, "the father of inertial navigation." The Prize was instituted by the National Academy of Engineering and endowed by Draper Laboratory, and is recognized as one of the world's preeminent awards for engineering achievement. It honors individuals, who like Dr. Draper, developed a unique concept and put it into practice in ways that contributed significantly to the advancement of science and technology, as well as the welfare and freedom of society. Once awarded biennially, the Draper Prize is now awarded annually.



THE NOMINATION PROCESS

Nominations of candidates for the Draper Prize, awarded to living persons from any country, are sought from members and foreign associates of the U.S. National Academy of Engineering, National Academy of Science, and Institute of Medicine; members and foreign associates of academies of engineering worldwide; members of recognized U.S. and international societies; and other individuals deemed eligible by the National Academy of Engineering who represent a broad spectrum of engineering disciplines.

For more information on the nomination process, contact the Public Affairs Office at the National Academy of Engineering at (202) 334-1237.

THE 1999 PRIZE

The 1999 Draper Prize was presented to Drs. Charles Kao, Robert Maurer, and John MacChesney on February 22, 2000, during a ceremony at the Department of State for their achievements in spearheading advances in fiber-optic technology. The importance of fiber optics and its impact on information technology and worldwide telecommunications cannot be overstated. The pioneering efforts of these three scientists have revolutionized the telecommunications industry; communications as we now know it, including the Internet, videoconferencing, electronic commerce, and high-quality long-distance telephone service, would not exist without their ground-breaking work.

Draper President Vince Vitto stated, "It is fitting that the men who developed the technology enabling the creation of fiber optics are awarded the Draper Prize. Fiber technology has allowed for worldwide information transport and has had a profound effect on the global information infrastructure."

DOCTOR CHARLES KAO



While working at ITT's Standard Telecommunications Laboratories in the 1960s, Dr. Kao considered using optical fiber for communication, instead of the bulky copper wire used at the time, and was the first to propose publicly a practical application for fiber-optic telecommunication. Analyzing samples from fiber makers, he concluded that fiber signal loss resulted from impurities and that silica glass could achieve the performance needed for successful communication. His concept for long-distance communication over single-mode fibers, developed with colleague George Hockham, was published in 1966. Dr. Kao's analytical basis for the development of optical fibers for telecommunications inspired the interest of other researchers world wide, and stimulated further research and development on glass fiber waveguides for communications.

Dr. Kao received a BSc in 1957 and a PhD in 1965, both in Electrical Engineering, from the University of London. He is currently Chairman and Chief Executive Officer of Transtech Services Ltd.

DOCTOR ROBERT D. MAURER

Dr. Maurer led a team of researchers at Corning Inc. (including co-inventors Donald Keck and Peter Shultz) who designed and produced the first low-loss optical fiber in 1970. While most researchers at the time were investigating compound glass, Maurer concluded that fused silica was more promising. There were some difficulties to overcome, however. It was expected that fabricating fiber from silica, with its high melting point, would be impractical due to imperfections introduced in the manufacturing process. Maurer and his colleagues solved some of these problems by devising a fiber preform from the vapor phase on a mandrel. When the mandrel was removed, the glass collapsed, and was drawn into a fiber. The material was then chemically graded to provide the low index of refraction and the higher index core needed for wave guiding. This materials design is in use today in all optical fiber for long-distance communication.

Dr. Maurer received BS and PhD degrees in Physics from the University of Arkansas, Fayetteville (1948) and the Massachusetts Institute of Technology (1951), respectively.



DOCTOR JOHN MACCHESNEY

In 1974, Dr. MacChesney, then of Bell Laboratories, announced a process for the controllable and reproducible manufacture of low-loss optical fibers. His process, Modified Chemical Vapor Deposition (MCVD) solved problems of purity and contamination from trace water, allowing the complex doping profiles needed for the optical waveguides to be achieved. The MCVD technique was introduced worldwide, and enabled the timely disposition of optical fiber. AT&T installed the first optical fiber communication system between Washington, D.C. and Boston, MA in 1981.

Dr. MacChesney received a BA from Bowdoin College and a PhD in Geochemistry from Pennsylvania State University. He is currently a Research Fellow at Lucent Technologies.



PREVIOUS RECIPIENTS

- 1997:** Vladimir Haensel for the development of the chemical engineering process of "Platforming" (short for Platinum Reforming), which was a platinum-based catalyst to efficiently convert petroleum into high-performance, cleaner-burning fuel.
- 1995:** John R. Pierce and Harold A. Rosen for their development of communication satellite technology.
- 1993:** John Backus for his development of FORTRAN, the first widely used, general purpose, high-level computer language.
- 1991:** Sir Frank Whittle and Hans J.P. von Ohain for their independent development of the turbojet engine.
- 1989:** Jack S. Kilby and Robert N. Noyce for their independent development of the monolithic integrated circuit.

