

working independently of Kilby, developed a similar idea that suggested a way to connect the components in such a device by depositing the interconnections "at the same time and in the same manner" as the components, using the planar process. Noyce filed a patent application for his "semiconductor device-and-lead structure" in July 1959. A lengthy legal battle ensued between Fairchild and TI over which invention was actually the integrated circuit.

Eventually the US patent office awarded Kilby the patent for the basic concept of the integrated circuit and Noyce a separate patent for his idea of interconnecting the chip's components. While the patents were being settled, however, the two companies worked out a cross license that in essence recognized both firms' claims to the device and enabled them to proceed with chip manufacturing. Any other company that wished to make integrated circuits had to obtain separate licenses from TI and Fairchild. Both US patents have since expired.

(Kilby and Noyce recently were awarded the National Academy of Engineering's Charles Stark Draper Prize for their work on the integrated circuit—see PHYSICS TODAY, November page 52.)

New chip patent

The Japanese patent, which is valid through 2001, covers all integrated circuits sold by Japanese companies in Japan, but not in the US. It does not cover chips sold by Japanese companies in Japan before the ruling.

In the past American companies have frequently complained about the Japanese patent system, which takes on average twice as long as the US to issue patents. As the chip patent dispute dragged on year after year, some US industry officials accused the Japanese government of intentionally delaying a decision to allow its own chip industry to catch up with foreign rivals. But the recent ruling now has Japanese companies griping: They claim that by awarding the patent for such a basic and widely used technology to an American company, the Japanese government is making a token goodwill gesture toward the US, for which Japanese chip makers will have to pay.

The news has industry analysts speculating wildly about potential royalty income for TI, with estimates ranging from \$240 million to \$700 million per year. In 1989 the company received about \$165 million in royalties from all its patents combined.

Texas Instruments, however, has remained sober throughout. Any dollar estimates of how much the company may stand to gain are just "absolute, pure speculation" at this point, a TI spokesperson said. The company won't begin to profit from the decision until 1991, when current cross-licensing agreements with Japanese chip manufacturers lapse and are renegotiated. When that happens, the new patent will be considered one part—albeit an important part—of the company's entire patent portfolio; the company will most likely arrange for exchanges of proprietary technologies with the individual Japanese companies, along with some royalty payments.

The current cross licenses, which date from 1986–87, are based on successful lawsuits brought against Japanese and Korean chip makers for infringing on TI's American patents. The company has since received \$440 million in royalty income based on chips sold in the US.

Comfort was reluctant to criticize Japan's protracted patent process. "We've had good experience getting patents there. These things just take time." The 29 years it took Texas Instruments to win the chip patent were due primarily, he said, to "procedural delays," with numerous rounds of rejections (by Japan's patent office), appeals (by TI), and objections (by rival companies). He estimated that the company files over 100 patent applications each year in Japan.

Texas Instruments didn't even disclose the integrated circuit patent decision until after a Japanese newspaper announced it in a front-page story on 20 November. A class-action suit has since been filed against TI and three of its executives in Dallas Federal District Court, claiming the company knew in August that it had won the patent. In response, a company spokesperson said Texas Instruments "is confident that it has fully complied with US disclosure requirements. . . . We plan to defend the suit vigorously."

—JEAN KUMAGAI

MOTOROLA JOINS IBM IN SYNCHROTRON LITHOGRAPHY EFFORT

At the end of October it was announced that Motorola Corporation has reached an agreement with IBM providing for the assignment of six to eight Motorola engineers to IBM's x-ray lithography program. The announcement was made in East Fish-

kill, New York, at the dedication of IBM's \$500 million Advanced Synchrotron Technology Center, which will house a synchrotron radiation facility.

The facility will include the country's first synchrotron radiation ring dedicated to the commercial etching of computer chips. In that process, circuit patterns are exposed on silicon wafers when x rays pass through a mask. The ring, which is being developed by Oxford Instruments Group PLC of Great Britain, is to become operational by 1991. In the meantime, IBM's experimental and development work is being conducted at the National Synchrotron Light Source at Brookhaven National Laboratory.

The terms of Motorola's agreement with IBM are limited to 21 months but provide Motorola the option of extending the agreement or of employing IBM technology to build its own x-ray production facility. The financial terms of the agreement were not disclosed.

The ultimate aim of the lithography project is to permit the production of chips containing more than 64 million transistors. Jack D. Keuhler, the president of IBM, has been quoted as saying that between 15 and 19 facilities similar to IBM's East Fishkill installation are under construction in Japan.

SONY ENDOWS BARDEEN CHAIR AT ILLINOIS

The University of Illinois has received a \$3 million endowed chair from Sony Corporation, the largest gift Sony has ever made to an American school. The endowment was announced at the October dedication of the university's new \$13.5 million Microelectronics Laboratory.

Sony's endowment will support the John Bardeen Chair of Electrical and Computer Engineering and Physics. Research done by Bardeen over the years has contributed to Sony's success as a leading manufacturer of consumer electronics equipment, company executives said. One of Sony's first products was a portable radio that made use of the transistor effect discovered by Bardeen, Walter H. Brattain and William Shockley at Bell Laboratories in 1947. An international search is under way to fill the new position.

Bardeen joined the University of Illinois faculty in 1951, and is now professor emeritus in the physics and

the electrical and computer engineering departments.

The new Microelectronics Laboratory houses the three-year-old Center for Compound Semiconductor Microelectronics, an engineering research center funded by the National Science Foundation. Research at the center focuses on optical and electrical materials, devices and systems based on gallium arsenide and other semiconductors. At present 50 faculty members are leading research teams at the center, which recently had its \$2.5 million-per-year grant extended by the NSF for the next three years. Construction costs for the new laboratory were covered by the State of Illinois.

✓ LANGER IS NEW HEAD OF NSF THEORETICAL PHYSICS INSTITUTE

James S. Langer has been named director of the NSF-funded Institute for Theoretical Physics, which is affiliated with the University of California, Santa Barbara. He succeeds J. Robert Schrieffer, who will return to his former positions as a physics professor at the university and a part-time member of the institute. Schrieffer stepped down last August.

Langer has been a permanent member of the Institute for Theoretical Physics as well as a professor in the physics department since 1982. Prior to that, he was a physics professor at Carnegie Mellon University. Langer received his BS in 1955 from Carnegie Institute of Technology and his PhD in 1958 from the mathematical physics department of the University of Birmingham, England. His research fields are theoretical solid-state physics and kinetics of phase transformations. Langer recently headed the Panel on Research Opportunities and Needs in Materials Science and Engineering, part of the Committee on Materials Science and Engineering.

The institute, now in its 11th year, operates on a \$2 million annual budget. That money comes from NSF, which recently extended the institute's funding for the next five years.

✓ ACS JOINS AIP IN HIGH SCHOOL SCIENCE TEACHER SURVEY

The Board of Directors of the American Chemical Society has voted to join the high school survey project that the American Institute of Physics

inaugurated three years ago (see PHYSICS TODAY, August, page 30). In the second round of the teacher survey, which is being conducted in 1989-90, ACS will cover the costs of including chemistry teachers. The project will be directed and carried out, as before, by AIP's Education and Employment Statistics Division. Including chemistry teachers will boost the projected size of the overall teacher sample to about 7500, up from 3300 in 1986-87.

Almost everybody who takes physics in high school takes chemistry first, so that chemistry courses serve as a gateway regulating the entrance of students into physics. Michael Neuschatz, the AIP staff member in charge of the research project, says that the combined survey should shed light on how chemistry courses and chemistry teachers influence decisions by students on whether to take physics, and it may help the physics community address the problem of low enrollment.

The collaboration between AIP and ACS is especially appropriate, Neuschatz notes, because of the overlap between the two disciplines at the high school level. The initial survey revealed that 40% of the physics teachers queried were also teaching chemistry that semester. In all, 64% of the physics sample had taught an average of ten years of chemistry over the course of their careers.

Besides adding new information on chemistry education in its own right, Neuschatz observes, the next round of the survey should deepen our understanding of physics instruction.

✓ WILSON TO LEAVE AAPT FOR NEW EDUCATION PROJECT

Jack Wilson has resigned as executive officer of the American Association of Physics Teachers, effective July 1990. Wilson, who has been with AAPT since 1982, will become the founding director of the new Lois J. and Harlan E. Anderson Center of Innovations in Undergraduate Education, at Rensselaer Polytechnic Institute in Troy, New York, and a professor of physics at Rensselaer.

The Center for Innovations in Undergraduate Education, which has been endowed at \$3 million, is intended to promote new approaches to education in all fields, through programs, conferences and publications. One project dear to Wilson's heart involves development of a computer-based introductory college physics

course.

Wilson will continue to oversee AAPT's joint programs with the Soviet Academy of Sciences and may continue to coach the US team for the International Physics Olympiad.

A search committee headed by AAPT past-president Gerald Wheeler of Montana State University has been formed to find a new executive officer for AAPT. The other members of the committee are AAPT President Judy Franz (West Virginia University), Ken Ozawa (California Polytechnic State University at San Luis Obispo), Dolores Mason (AAPT staff), Howard Voss (Arizona State University) and Joe P. Meyer (Northern Illinois University).

✓ OPTICAL SOCIETY MAY ADD 'PHOTONICS' TO ITS NAME

What's in a name? Quite a bit—at least in the eyes of the Optical Society of America. Board members recently voted overwhelmingly (15 to 2) to recommend changing the group's name to the Optics and Photonics Society. They also decided to rename *Optics News*, one of the society's publications, effective immediately. Beginning with the first issue this year, the magazine will be called *Optics & Photonics News*.

The name changes are "in the clear interest of our society," Herwig Kogelnick, then OSA president, wrote in a November 1989 letter to past officers. He admitted that the board was initially shocked at the suggested changes, which were proposed by OSA's objectives and policy committee, but quickly warmed to them. The new name would serve as a "strong symbol of our society's intention to participate vigorously in the rapid growth of photonic science and technology," Kogelnick wrote.

Before the society can take its new name, members must first ratify the change, as required by law in New York State, where OSA is incorporated. The vote will occur at the next annual business meeting, scheduled for November 1990 in Boston.

✓ GOODMAN ELECTED VICE PRESIDENT OF OPTICAL SOCIETY

Joseph W. Goodman of Stanford University has been elected vice president of the Optical Society of America for 1990. After serving a one-year