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Martin Pope, Whose Research Led to OLEDs, Dies at 103

The work done by the self-effacing Dr. Pope helped pave the way for the high-performance electronics displays that are so common today.

By Katie Hafner
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Martin Pope, a physical chemist whose fundamental work on molecular semiconductors more than 60 years ago led to the development of organic light-emitting diodes, or OLEDs, which are used in digital cameras, mobile phones, solar panels and televisions, died on Sunday at his home in Brooklyn. He was 103.

His death was confirmed by his daughter Deborah Pope, who did not specify a cause.

OLEDs are thin organic materials sandwiched between two electrodes that illuminate when tweaked with an electrical current. Highly energy efficient and often wafer thin, OLEDs are the technology of choice in high-end cellphone displays and televisions.

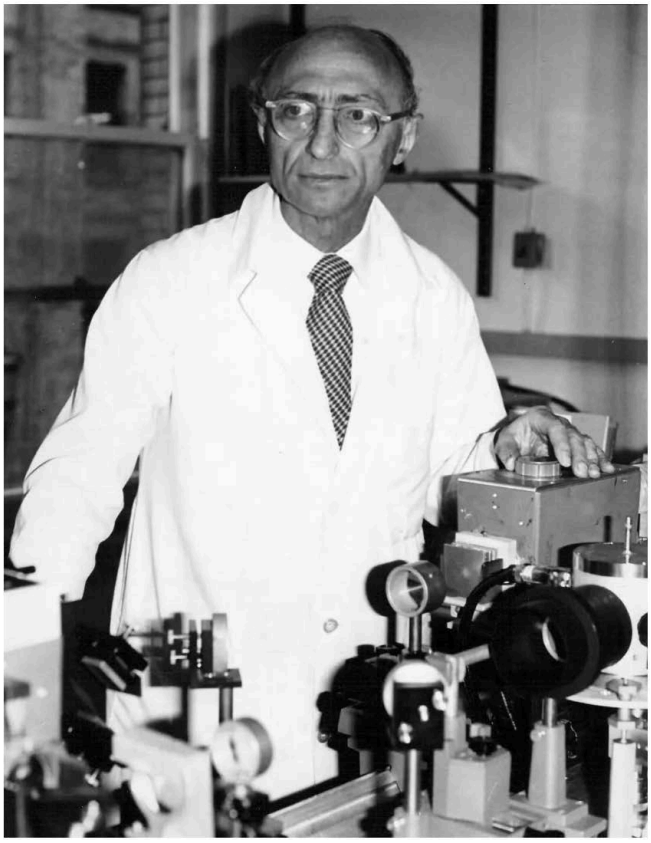
In the late 1950s and early 1960s, Dr. Pope (who changed his last name from Poppick to avoid anti-Jewish prejudice) made a series of discoveries that laid the basis for the field of molecular semiconductors.

He based his experimental studies on organic compounds called anthracene and tetracene. It was a serendipitous choice: Dr. Pope found that these compounds contained the necessary ingredients for the creation of carbon-based electronic devices that paralleled the operation of silicon. But unlike silicon, which comes from minerals, carbon-based materials with semiconductor properties can be soft and pliable, making them easier to shape into thin films used in electronic devices.

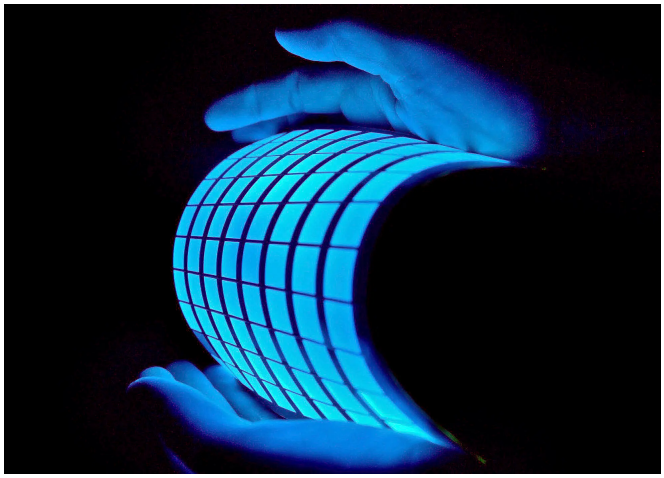
In the early 1960s, Dr. Pope published one of his most important papers, “Electroluminescence in Organic Crystals,” which reported that electricity could be used to generate light from anthracene. “That was a milestone that has found root in the high-performance displays we’re seeing today,” said Richard Friend, a physicist at the University of Cambridge.

Dr. Pope’s insight into some of the strange quantum mechanical phenomena shown by tetracene also turned out to be well ahead of its time. In a paper published in 1969, he demonstrated the possibility of producing two excited molecules, or excitons, in a tetracene crystal after just one photon of light was absorbed in it.

The result, Dr. Pope said in a 2011 interview for this obituary, was a scientific two-for-one. “Since two excitons are created by a process that usually creates one, the efficiency of converting light into useful electric current is greatly increased,” he said. The practical application of the discovery is growing apparent as it offers a way to improve the efficiency of solar cells.



Martin Pope in his lab in the early 1970s. His research helped pave the way for the electronics found in digital cameras, mobile phones, solar panels and televisions via Deborah Pope



Flexibility is one of the appeals of organic light-emitting diodes, or OLEDs. They are the technology of choice in high-end cellphone displays and televisions. General Electric

"If you go through the scientific literature, too often stuff is plain wrong," said Professor Friend. "Martin managed to get a whole range of things absolutely right so early, and I marvel at that."

Having laid the scientific foundations for the field, Dr. Pope wrote, with Charles E. Swenberg, the definitive text "Electronic Processes in Organic Crystals and Polymers." First published in 1982, the book of more than 1,300 pages remains the principal reference in the field of organic semiconductors.

Dr. Pope, who focused on basic research, held few patents and did not seek to profit from his discoveries.

In 2006, the Royal Society awarded Dr. Pope the Davy Medal, given annually to a scientist whose research helped bring about extraordinary advances in any field of chemistry. Several people who have built on Dr. Pope's work have won Nobel Prizes. In 2000, the prize in chemistry was awarded jointly to Alan J. Heeger, Alan G. MacDiarmid and Hideki Shirakawa for inventing a technique for making plastic conduct electricity.

"In a sense, Martin Pope's work was a prelude to all that," Sir John Meurig Thomas, an emeritus professor of chemistry at the University of Cambridge, said in an interview in 2011. (He died in 2020.)

Martin Pope was born Isidore Poppick on Aug. 22, 1918, in a tenement on the Lower East Side of Manhattan. His parents, Phillip and Anna, were both Jewish immigrants who had come to New York from Poland as teenagers. His father worked as a laborer in a fur shop, stretching animal skins.

"We were completely dependent on whether times were good enough for people to buy fur coats," Dr. Pope said in the 2011 interview.

In 1938, as an undergraduate at the City College of New York studying physical chemistry, the 20-year-old Isidore Poppick published a research paper in the prestigious Journal of the American Chemical Society.

After serving as a first lieutenant in the Army Air Forces in World War II, he sought employment. Aware of an undercurrent of antisemitism, Dr. Pope applied in 1946 for a position at the American Cyanamid Company using two names: Isidore Poppick, with the published paper listed on his résumé, and Martin Pope, with no such record.

"Martin Pope received an application, and Isidore Poppick received a notice that no positions were available," Dr. Pope said. "I decided to use Martin Pope as my new name." One of Dr. Pope's brothers also changed his name to Pope when he encountered similar prejudice while looking for work.

In 1946, Dr. Pope took a position as a research scientist at Balco Research Laboratories, a small industrial research laboratory in Newark. Also that year, he married Lillie Bellin, a high-school teacher; they remained married until her death in 2015.

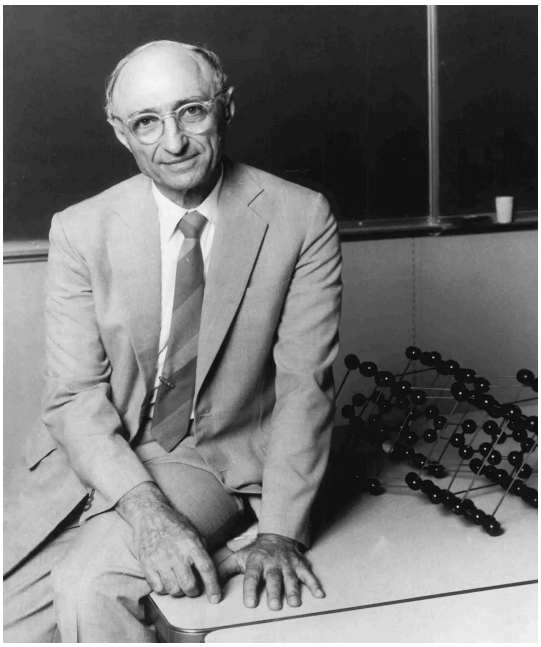
Dr. Pope returned to Balco after a break for graduate studies at the Polytechnic Institute of Brooklyn, where he received his Ph.D. in 1951.

But, unhappy with the commercial sector's emphasis on patents, Dr. Pope left Balco in 1956 and took a post as a research scientist in the physics department at New York University, where he began to experiment with inorganic and organic insulators that could be used to store data. He remained at N.Y.U. for the duration of his career.

Besides his daughter Deborah, Dr. Pope is survived by another daughter, Miriam Pope; a brother, Michael; and four grandchildren.

Dr. Pope was known among his colleagues and friends as someone who shunned self-promotion. "He was a scientist's scientist, and by that I mean he never sought great publicity," said Roald Hoffmann, a theoretical chemist at Cornell who was a winner of the Nobel Prize in Chemistry in 1981. "He just kept on working and producing good work."

In the 2011 interview, Dr. Pope said he was surprised by the practical application of his discovery. "At the time I carried out my research," he said, "I did not have the faintest idea that it would become of worldwide importance."



Dr. Pope in 2006. "At the time I carried out my research," he said, "I did not have the faintest idea that it would become of worldwide importance." via Deborah Pope

Katie Hafner, a former staff reporter for The New York Times, is a co-author of "Where Wizards Stay Up Late: The Origins of The Internet."

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