



## In memoriam: Walter Lyons Brown

Walter Lyons Brown, long-time research physicist at Bell Laboratories, passed away October 29, 2017, in Basking Ridge, N.J., at the age of 93.

Walter graduated from Duke University in 1945 with a BS degree in physics before spending several years as an ensign in the Navy. He went on to earn his PhD degree in physics from Harvard University in 1951 under the supervision of Nobel Laureate Edward Purcell. Brown worked for Bell Labs for 51 years and later joined Lehigh University as an adjunct professor, where he remained active in mentoring students. Among his many honors, he received the Von Hippel Award from the Materials Research Society (MRS) for “pioneered studies on semiconductor surface states, semiconductor radiation detectors, and the application of particle/solid interactions to the study of materials.”

“Walter was an amazing scientist-leader who was revered by all young scientists who knew him,” said Tom Picraux, Center for Integrated Nanotechnologies, Los Alamos National Laboratories. “He led by doing, never asking one to do more than he did himself. He loved to engineer the parts needed for an experiment, while also managing a large department at Bell Labs. At conferences, he sat up front and always asked the tough questions, yet he was always kind to everyone. We all tried to follow his example,” said Picraux.

“In March 1981, I interviewed at Bell Labs,” said Julia Phillips, Sandia National Laboratories. “I gave a seminar and spent the rest of the day in one-on-one discussions with various individuals. One of those discussions truly changed my life—my interview with Walter. The conversation launched from the subject of my seminar, about which he seemed to know

a lot, into a discussion at the blackboard of the potential meaning of the results and where one might be able to take the research beyond its current state. I left thinking, “I have to work for that man!”

Walter first started working in the Contact-Physics Department of Bell Labs before moving to the Transistor-Physics Department. His observation of the field effect on surface conductance in germanium was one of the more important scientific contributions in his early career. This fledgling semiconductor science led to the exploration of the effects of energetic particle bombardment, which had an influence on the remainder of his career. He made pioneering observations of the field effect on surface conductance and inversion layers at the surface of a semiconductor and the relation of these properties to the chemical environment of the surface. This research was significant to the subsequent development of transistors and other silicon-based devices.

“Once in the early 1970s, I was visiting Bell Labs for a couple of weeks to do ion channeling measurements of Bi atom lattice location in Si when displaced due to vacancy trapping. Walter became interested in joining the study to try out the new double alignment channeling setup he had developed himself. He had built the parts and set up the special detector, and we took the first double alignment measurements of this kind,” said Picraux. “But what I remember most about this visit is the evening there was a pump failure contaminating the experimental chamber. I came in early the next morning to work on it only to find Walter, with his sleeves rolled up and already having been there for over an hour working on cleaning up the system. I was astounded

that even though he was the manager of a large department, he didn’t wait for the technicians or the rest of us to do the cleanup, but quietly took it upon himself to take the lead in returning things to normal operations. It taught me a lesson in humility and responsibility I will never forget,” said Picraux.

Later, Brown helped Bell Labs develop a research program in nuclear power and contributed significantly to work on the interaction of ion beams with solids and ion implantation, a technology that strongly advanced the industrial production of silicon semiconductors.

“Walter was a superb scientist and engineer whose personal and corporate research endeavors ranged from semiconductor physics, space and planetary communication and physics, radiation damage phenomena, ion implantation and laser annealing, and integrated-circuit thin-film interactions,” said John Poate, emeritus senior vice president at the Colorado School of Mines, who worked with Brown at Bell Labs. “He is emblematic of the unique role that Bell Labs and its leading scientists and managers played in creating the modern world of communication and computation.”

“He would delve deeply into the science being done by the staff in his department, had an ability to ask a very simple question that would unmask a researcher who had not thought through their work, and had a willingness to defend a scientific idea and the person proposing it to the very top of the Bell Labs organization,” said Phillips.

Although work and education were important to Walter, even more so were his family and faith. He was married to his wife Lucie for 71 years and volunteered for his church by teaching Sunday school for more than 40 years, and repairing homes and designing solar panels while on mission trips. Walter served as a principal editor of the MRS *Journal of Materials Research* and was editor-in-chief from 1987 to 1993. He also received honors from the National Academy of Sciences and the National Academy of Engineering.

“As the next generation launches their careers, I can only hope that they have the extraordinary good fortune to have a ‘Walter’ in their lives,” said Phillips. □