



Paul A. Burch

PAUL A. BECK

1908–1997

Elected in 1981

“For pioneering studies in deformation and textures of engineering alloys and in electronic and magnetic characterization of complex alloy systems.”

BY EDGAR A. STARKE, JR.

PAUL A. BECK, Professor Emeritus of Metallurgy at the University of Illinois, died in Urbana, Illinois, on March 20, 1997, at the age of 89. He was elected a member of NAE in 1981 “for pioneering studies in deformation and textures of engineering alloys and in electronic and magnetic characterization of complex alloy systems.”

Born in Budapest, Hungary, in 1908, Paul attended the Royal Hungarian Technological Institute in Budapest, where he studied mechanical engineering. He subsequently received an M.S. in metallurgy in 1929 from Michigan Technological University and conducted postgraduate research with Professor Michael Polanyi at the Kaiser Wilhelm Institute of Metallurgy in Berlin, Germany, and Pierre Auger at the University of Paris, France. He returned to Michigan Technological University in 1935 to conduct research. He then worked as a research metallurgist in several industries from 1937 to 1945.

He began his academic career in 1945 at the University of Notre Dame, where he later became head of the Department of Metallurgy. He joined the faculty of the University of Illinois as professor of metallurgy in 1951 and retired as Professor Emeritus in 1975. He continued to conduct research and publish in scientific journals until 1989.

Professor Beck began working on recrystallization, grain growth, and textures in metals in the 1930s and continued to work on them at the University of Notre Dame and University of Illinois until about 1970. During that time, he made significant contributions to the concepts of “oriented growth” and “oriented nucleation” of grains. Paul found that the predominant grains in recrystallized samples differed greatly in orientation from the rolled (deformation) texture, often being related to the deformation texture by rotations of 25 to 35 degrees about a common [111] crystallographic direction. In samples with low initial strains (5 to 15 percent), however, the nucleation of new strain-free grains was markedly different; no new orientations nucleated and grew. Instead, existing high-angle grain boundaries moved into their strained neighbors leaving behind strain-free recrystallized regions. This new mechanism of nucleation in recrystallization was called strain-induced grain-boundary migration.

Early in the 1950s, Paul began working on phase diagrams of transition-metal alloys, especially the intermediate phases. Those studies required the fabrication and examination of many samples, which meant enormous labor on the part of his students. Paul worked himself and his students very hard. He was known to phone his laboratory at 8:00 a.m. each morning and ask to speak, in sequence, to each of his students. At 5:00 p.m., he would walk through the laboratory asking each student what he or she had accomplished that day and making suggestions for the next stage of their research. Students often had to work late into the night to produce results by the next morning. He often remarked to a student, “This research will not win you the Nobel Prize, but it will be a good contribution to science.” The cumulative work of his research group resulted in an immense gain in the understanding of properties of alloy phases.

Although Paul required that his students perform at a very high level, he was a compassionate person. After the ill-fated 1956 Hungarian revolution, the University of Illinois offered a three-month English course for a dozen Hungarian college-bound refugees. Upon completion of the course, Professor Beck

unselfishly helped these students move on or find positions at the university. He wrote letters on their behalf to appropriate agencies and personally accompanied some of them to make it easier for them to get part-time jobs. He offered valuable advice to all who asked and often was translator, chauffeur, and spokesman for those in need. At times he also helped out with much needed cash.

One of these students, Denes Bardos, remarked, "He took a great risk in offering me a lab assistant job in his renowned research lab on campus, because at that time I was a music student. I worked very hard so as not to disappoint the hard-driving professor and took his advice and switched over to metallurgy. He became my faculty advisor, mentor (or should I say tormentor), all the way to the completion of my Ph.D. I could not have done it without his constant support and encouragement."

Professor Beck's major contribution to metal physics involved the determination of the density of electronic states across the 3d transition metal series. Such information requires measurements of specific heat at low temperatures where the specific heat is linear with temperature. These very difficult experiments required measurements of alloys at closely spaced e/a (electron/atom ratio) intervals all across the 3d transition metal series.

C. T. Wei and C. H. Cheng, two excellent researchers working with Paul during this period, worked closely with his students, and his group made more low-temperature, specific-heat measurements than all of the physicists in the world had made to that time. Paul's research evolved into studies of the magnetic characteristics of alloys and compounds—ferromagnetism, paramagnetism, superparamagnetism, mictomagnetism, and other effects.

Paul Beck won many awards and honors for his work. He was a fellow of the Minerals, Metals and Materials Society (TMS), American Society for Metals (ASM), and American Physical Society. In 1952, he won the Mathewson Gold Medal for one of his papers on recrystallization. He was Annual Lecturer of the Metallurgical Society of The American Institute of Mining,

Metallurgical and Petroleum Engineers (AIME) in 1971. He received the Hume-Rothery Award from TMS in 1974 and the Albert Sauveur Award from ASM in 1976. In 1979, he received the Heyn Memorial Award from the German Metallurgical Society and an honorary degree from Montanuniversitaet Leoben.

In 1978–1979, Paul worked in Munich and Berlin, after receiving a Humboldt Senior Scientist Award. In 1991, he received an Honorary Degree of Doctor of Science from the University of Illinois, a rare honor, particularly for a faculty member. During Paul's professional career he served on numerous committees for the Institute of Metals Division of AIME, The American Society for Metals and the American Society for Testing Materials. During his career, he published more than 170 technical papers in scientific journals.

As a young academic, Paul often visited the laboratory of Cyril Stanley Smith, director of the Institute for the Study of Metals at the University of Chicago. On one of these visits, he met Lillian who was working in the laboratory. The couple later married and had two sons, Paul John Beck and Philip Odon Beck. Paul is survived by both sons and five grandchildren.

