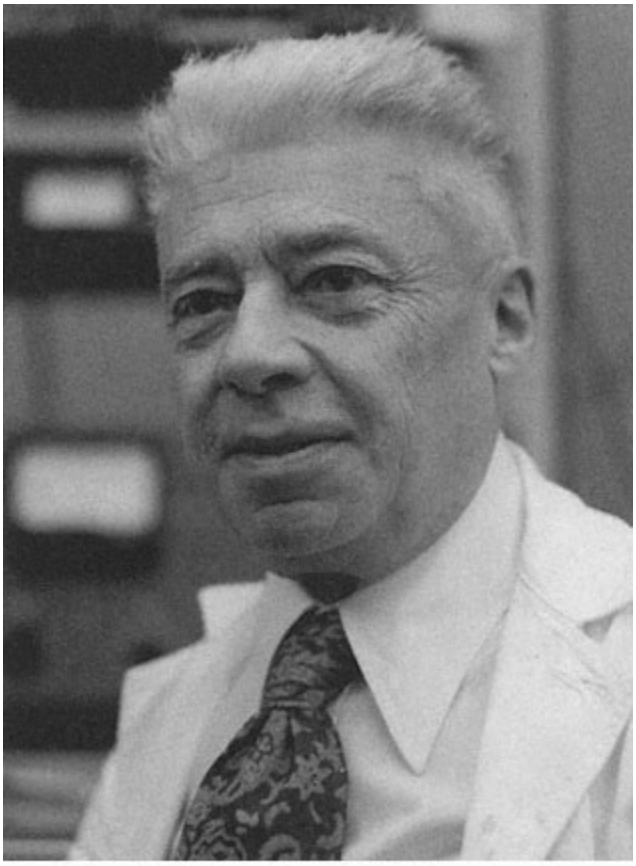

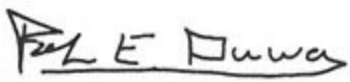

Pol E. Duwez

1907–1984

By Morris Cohen

Pol E. Duwez, one of the world's foremost scientists in the field of metals and materials, died in Pasadena, California, on December 31, 1984, at the age of seventy-seven. At the time of his death, he was professor emeritus of applied physics at the California Institute of Technology (Caltech).

His contributions to the fields of education, research, and technology covered a remarkably wide range of solid-state phenomena. These phenomena included plastic deformation and wave propagation, heat transfer and transpiration cooling, powder metallurgy, stable and metastable alloy systems, high-temperature alloys and ceramic materials, magnetic and superconducting phases, and the discovery of metallic glasses by novel quenching from the liquid state.

Professor Duwez was an internationalist in his personal background as well as in his career. He was born on December 11, 1907, in Mons, Belgium, and received much of his schooling in that community. He earned a degree in metallurgical engineering at the Mons School of Mines, graduating in 1932. During that formative period, he developed strong interests in music as well as in mathematics and physics. Indeed, he started to study the cello at the age of six and remained a serious cellist throughout most of his life, with special affection for chamber music. He continued his scientific education at the University of Brussels, where he received his D.Sc. in physics in 1933.

In 1933 Dr. Duwez was also awarded a Belgian-American Foundation fellowship, which enabled him to spend the period from 1933 to 1935 as a research fellow at the California Institute of Technology. There he was privileged to work under Theodore von Karman on the mechanical behavior of solids. This personal relationship and the concomitant professional experience were destined to play a telling role in the uniqueness and scope of Pol Duwez's research achievements during the ensuing years. In 1935, at the completion of his fellowship, he returned to Belgium, but not before meeting a gracious lady, Nera Faisse, who became his bride and constant companion. Their daughter, Nadine, was born in Brussels two years later.

During the next few years, Dr. Duwez was a member of the staff of the National Foundation for Scientific Research in Mons. Before long, however, he was appointed director of the National Laboratory for Silicates and assigned the task of establishing a new facility for ceramics research. This post gave him a fine opportunity to build on his previous studies of solid-state materials. But complications of World War II soon cut short his efforts. Fortunately all of the Duwez family members managed to escape from Belgium and find their separate ways back to Pasadena in 1940.

The following year, Dr. Duwez worked as research engineer on various defense projects at Caltech. In this capacity, he was able to demonstrate von Karman's theoretical prediction regarding the propagation of plastic-deformation waves in metals as a result of impact loading. From that point on, Pol Duwez's career at Caltech was assured.

After Dr. Duwez received his U.S. citizenship in 1944, von Karman selected him to head the materials section of the newly organized Jet Propulsion Laboratory, a position he held until 1954. During that exciting decade of research in and development of high-temperature rocket materials, Dr. Duwez was also appointed to the Caltech faculty, first as associate professor in 1947 and later, in 1952, as professor of materials science. He did not retire until 1978.

As an educator, Pol Duwez's well-known creativity flourished, not only in research but also in the development of new courses in physical metallurgy and materials science. His lectures were always carefully prepared and clearly focused, conveying substance with a minimum of embellishment. He was capable of inspiring students, both in teaching and in research, and offered a rare balance of imaginative ideas while patiently allowing students the freedom to explore.

As a result, Professor Duwez and his students were often among the "firsts" on numerous fronts. They were leaders in the early investigations of titanium and molybdenum alloys for potential high-temperature applications; in the elucidation of phase relationships exhibited by refractory rare-earth oxides; and in the proliferation of the "gun technique, commonly referred to as "splat quenching," for the rapid quenching of alloys from the liquid state. The latter experimentation led to the retention of extraordinary degrees of supersaturation in solid solutions, to the formation of entirely new metastable crystalline phases, and, most significantly of all, to the discovery of metallic glasses.

Under the guidance of Pol Duwez, it was also established for the first time that amorphous alloys can be ferromagnetic and even superconducting. These findings are now considered to have been a profound scientific advance—an advance that paved the way for literally thousands of papers from laboratories around the world. Moreover, ferromagnetic metallic glasses are now in commercial production for electric transformer and device applications.

Dr. Duwez's exceptional accomplishments and experience in the materials science and engineering of materials permitted him to contribute effectively to the work of many professional and governmental committees. Among the latter, he served with distinction on the Scientific Advisory Board to the chief of staff of the U.S. Air Force, the U.S. Ordnance Advisory Board on Titanium, the U.S. Navy Advisory Committee on Molybdenum, the Subcommittee on Structural Materials of the National Advisory Committee for Aeronautics,

the Senior Scientists Steering Group of the U.S. Army Ordnance Corps, the Materials Research Council of the Defense Advanced Research Projects Agency, and the NATO Advisory Group for Aeronautical Research and Development.

Professor Duwez's 120 publications, the success of his talented students, and his extensive service on national and international committees have earned him the highest professional esteem. The honors and awards he received in this country and abroad are indicative: the Charles B. Dudley Award of the American Society for Testing Materials (1951); the Champion H. Mathewson Gold Medal and the William Hume-Rothery Award of the Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) (1964 and 1981, respectively); Edward DeMille Campbell Lecturer of the American Society for Metals (1967); the Francis J. Clamer Silver Medal of the Franklin Institute (1968); the Albert Sauveur Achievement Award of the American Society for Metals (1973); the Belgium Priz Gouverneur Cornez (1973); the Paul Lebeau Medal of the French Society of High Temperature (1974); the International Prize for New Materials of the American Physical Society (1980); and the Heyn Medal of the Deutsche Gesells-chaft für Metallkunde (1981). He was elected to the National Academy of Sciences (1972), the American Academy of Arts and Sciences (1976), and the National Academy of Engineering (1979).

Dr. Duwez was also a fellow of the Metallurgical Society of AIME, the American Ceramic Society, the American Society for Metals, and the American Association for the Advancement of Science. He was a member of the American Physical Society, the Association of Applied Solar Energy, the Society of Sigma Xi, and the American Association of University Professors. Internationally renowned in his field, he was also a member of the British Institute of Metals and the French Society of Civil Engineers.

After Pol Duwez retired in 1978, he continued frequent

contact with both his colleagues at Caltech and with his associates worldwide until his final illness in 1984. He is survived by his wife Nera, of Pasadena; his daughter Nadine, of Paris; and a host of scientists and technologists who are the direct and indirect beneficiaries of his lifelong work.

To all of us who had the privilege of knowing him, he will be remembered as a considerate, scholarly human being of independent spirit, who preferred not to follow trends but rather to create them.