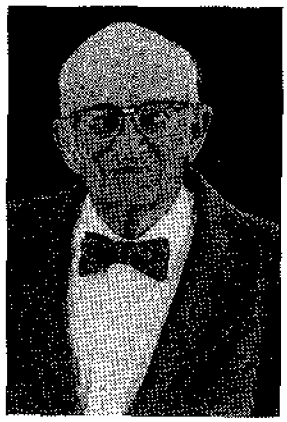
CHARLES S. BARRETT
1902-1994



Charles S. Barrett, or Chuck, as he was generally known, had a long and distinguished career in the field of Materials Science. The impact of his work was particularly great in those areas of the field in which diffraction is used to advantage to reveal structural aspects.

He was born in 1902 at Vermillion, South Dakota. He obtained his B.S. degree in Engineering at the University of South Dakota in 1925, and his PhD at the University of Chicago in 1928. His thesis - in Physics - under A. H. Compton was the first demonstration of x-ray scattering from individual atoms. He described some of these early experiments as follows: "The first thing you have to do is build your x-ray tube and then your detector."

His early professional years were spent at the Naval Research Laboratory where he worked with R.F. Mehl to establish gamma-ray radiography as a practical NDE method and co-authored with Mehl a number of papers on Widmanstätten structures in alloys. The years from 1932 to 1946 were spent at the Carnegie Institute of Technology in Pittsburgh, in the Department of Metallurgy and the Metals Research Lab. During this period he taught x-rays, and physical metallurgy. He undertook a series of investigations on the origin and nature of preferred orientation in alloys; phase transformations, age hardening, fatigue, slip and twinning at various temperatures. He was one of the pioneers in the use of the electron microscope for investigating metallic structures. With M. Gensamer, he published one of the early papers on measurement of stresses with x-rays. He also developed a new method of imaging crystals employing x-ray diffraction, which was a refinement of an early method due to W. Berg, and allowed useful magnifications up to 100x. The method later became known as the Berg-Barrett method.

During this period, he was encouraged to organize the general reviews which he had written on different areas in which he was doing research, together with the material he had been teaching, into a single publication. The resulting book: "The Structure of Metals," published by McGraw Hill, first appeared in 1943. A second edition appeared in 1952, and a third edition

(with T. B. Massalski as co-author) in 1966. The book has been a mainstay for a generation of metallurgists and has been translated into at least 4 languages besides English.

From 1946 to 1971, Dr. Barrett was a professor in the Institute for the Study of Metals (later named the James Franck Institute) at the University of Chicago. Here he discovered the phase changes in Lithium at low temperatures and explored the structures of alkali and other metals, including Uranium, down to 4.2°K. In cooperation with Lothar Meyer and his students, Dr. Barrett published a series of papers on the crystal structures and phase diagrams of frozen gases, particularly oxygen. Studies were also done on Bi, Sb, and As and their alloys at low temperatures. In cooperation with W. White and his associates, Dr. Barrett investigated the "blocking patterns" obtained in proton diffraction from crystals and showed that the patterns could be readily indexed and used for phase identification. An approximate method of calculating intensities was worked out in cooperation with his daughter Marjorie Barrett Gultepe who joined him in one of these studies.

In 1971 after "retiring" from the University of Chicago, he moved to the University of Denver as professor in the Metallurgy Department where he continued research and teaching in Physical Metallurgy and Crystallography. He developed a course called "Materials and Art" which was very popular and became a requirement for students of sculpture at the University. With L. Trueb he published a detailed analysis of the internal structure of ballas diamonds. With P. K. Predecki, he developed methods for measuring residual stresses in polymers and polymer matrix composites by dispersing small amounts of diffracting filler particles in the matrix. This allowed curing stresses and the effects of moisture uptake by composites to be investigated. Residual and applied stresses at the bond-line of adhesive-bonded interfaces were also investigated by making one of the adherends out of Be to permit access of the x-ray beam.

During his illustrious career, Dr. Barrett received many honors and awards, of which only a much-abbreviated list is given below.

The Mathewson Medal of the AIME in 1934, 1944 and 1950
The Howe Medal of the ASM in 1939
The Clamer Medal of the Franklin Institute
The Edward Demille Campbell Lectureship of the ASM in 1956
The Sauveur Achievement Award of the ASM in 1966
The Heydn Medal of the German Metallurgical Society in 1966
He was named a Fellow of the American Physical Society, of the AIME and of the ASM. In 1967 he was elected to the U.S. National Academy of Sciences.

From the early 1970's until his death in July, 1994, he was extensively involved with the Denver X-Ray Conference. He served on the Organizing Committee as co-chairman and later as honorary chairman of the Conference as well as editor of the proceedings: *Advances in X-Ray Analysis*. The Conference's biennial award for excellence in x-ray diffraction - The Barrett Award - is named in his honor.

His many friends and colleagues in the x-ray field were saddened at his passing. We will miss his bright insight, his enthusiasm, his wonderfully cheerful, optimistic personality, and his sense of curiosity and wonder at any new phenomenon or effect.

Our deepest sympathy is extended to his wife, Dorothy, and his daughter, Marjorie Barrett Gultepe, of Green Valley, Arizona.

Paul K. Predecki
June 1995