80th Birthday Symposium for Professor C. Zener Von Hippel Winner

W. W. Mullins
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A symposium was held in honor of Professor Clarence Zener on the occasion of his 80th birthday to recognize the impact of his work on many fields of science and engineering. The symposium was held at Carnegie-Mellon University (Pittsburgh, PA) on November 23, 1985. The symposium was attended by approximately 100 scientists and engineers from many fields and many parts of the world. At the banquet celebration, H. A. Simon spoke on scientific creativity. Papers were presented by F. Seitz, C. A. Wert, J. Weertman, M. Hillert, R. J. Duffin and E. L. Peterson, and by the guest of honor, C. Zener, who has developed a new theory of strong electrolytes. These papers, and one prepared later by W. J. Carr, Jr. and M. Garbuny, will appear in the *Journal of Applied Physics*.

The symposium papers demonstrated the impact of Zener's pioneering work on metallurgy and materials science, solid-state physics, engineering, and mathematics. This impact derives partly, I believe, from the simplicity with which the basic physics underlying key phenomena is exposed in Zener's work, and partly from the creative influence of his personality on his colleagues. In many cases he has originated entire fields of investigation (e.g. internal friction, geometric programming). Spanning the full range of Zener's scientific contributions, however, proved to be an elusive goal for the symposium. Not covered in any detail, for example, was his work in atomic physics and his theory of dielectric breakdown.

Zener received his BS degree from Stanford in 1926 and his PhD from Harvard in 1929. During the following five years he was awarded fellowships that took him to several universities in Germany, to Princeton University and to Bristol University, England. He has held academic posts at Washington University (St. Louis, MO), City College of New York, Washington State University, University of Chicago, Texas A&M University and Carnegie-Mellon University, where he has been since 1968. He was with the Watertown Arsenal (Maryland) for three years during World War II, and later with the research laboratories of Westinghouse Electric Corporation in Pittsburgh for 15 years.

Zener has received the following awards: Exceptional Civilian Service Award (1946) of the War Department; Bingham Award (1957) of the Society of Rheology; Wetherill Medal (1959) of the Franklin Institute; Albert Souveur Achievement Award (1965) of the American Society for Metals; Gold Medal (1974) of the American Society for Metals; and the Von Hippel Award (1982) of the Materials Research Society. He is a fellow of the American Physical Society and a member of the National Academy of Sciences.

Professor Zener had the following remarks about his career:

The two men who had the greatest influence on my work are J. R. Oppenheimer and P. W. Bridgeman. I was fortunate to spend a whole day with Oppenheimer in 1930. I recognized the impossibility of competing with men of his caliber in developing the fundamental laws of physics, and that I must be content with explaining observed phenomena in terms of known laws. Bridgeman imparted to me his passion for thermodynamics. It was this insight he provided that gave me the clue to a wide range of physical problems. My work at Watertown Arsenal taught me that tackling practical problems exposes one to basic physical problems that have not been discussed in the scientific journals, and therefore acts as a powerful catalyst.

I have always derived pleasure from recognizing areas that have lain outside the mainstream of physics research, but that obviously can be understood by the application of physical principles. I would immerse myself in these studies for several years until they attracted other physicists.

In the sixties I had been interested in environmental problems, but it was not until I came to Carnegie-Mellon University that I had the leisure to give more than occasional attention to such problems. I decided to search for an economic way of utilizing the renewable work potential in our environment. In this endeavor I soon recognized how little we physicists knew about water. I hope my present work will lead other physicists to take the plunge.

Frontiers of Electron Microscopy in Materials Science

The first conference in a series on "Frontiers of Electron Microscopy in Materials Science" was held April 20-23, 1986 at Argonne National Laboratory (Illinois). The conference was sponsored by the Materials Science and Technology Division at Argonne, the Chicago Section of The Metallurgical Society of AIME, and the Midwest Society of Electron Microscopists. The conference was attended by more than 225 participants including 20 from foreign countries. Of the participants, 56% were from universities, 31% from industry, and 13% from national laboratories. Of the university participants, 30% were graduate students from universities around the United States.

Plenary lectures acquainted the conference participants with state-of-the-art techniques in electron microscopy. These lectures were followed by a series of presentations on advanced topics which gave examples of how these techniques have been applied to problems in materials science. Each contributed oral presentation was also associated with a poster. In this way, discussions on contributed talks continued beyond the lecture hall. The conference proceedings, including more than 50 papers, will be published as a regular issue of the journal *Ultramicroscopy* late in 1986.

The invited speakers (and their topics) were as follows:
D. J. Smith (High Resolution Electron Microscopy)
J. A. Eades (Convergent Beam Electron Diffraction)
D. B. Williams (X-Ray Energy Dispersive Spectroscopy in the Analytical Electron Microscope)
R. Gronsky (High Voltage Electron Microscopy)
J. M. Gibson (High Resolution Electron Microscopy of Interfaces and Surfaces)
M. Rühle (Structure, Chemistry, and Diffusion Bonding of Metal/Ceramic Interfaces)
A. Heuer (Coherent Interfaces in Zirconia-Toughened Yttria-Zirconia Alloys)
A. Crewe (High Resolution Scanning Transmission Electron Microscopy)
C. Colliex (Analytical Electron Microscopy: Why are the Ultimate Limits of EELS yet Unforeseen?)
P. Batson (Detection of Local Changes in Bonding and Electronic Structure Using High Resolution EELS)
O. L. Krivanek (Design and Performance of a Parallel Detection EELS System)
F. P. Ottensmeyer (Elemental Mapping with an Imaging Electron Spectrometer)
L. E. Thomas (Microanalysis using Fine Probes)
N. J. Zaluzec (Intermediate Votage AEM; Advantages Versus Disadvantages)
J. J. McCarthy (A Review of Spectral Artifacts in EDS)
L. E. Allard (High Resolution TEM Imaging and Microanalysis of Supported Metal Catalysts)
J. M. Cowley (Subnanometer Diffraction)
L. D. Marks (Profile Imaging of Surfaces)
H. K. Birnbaum (Effect of Environmental Interactions on Deformation and Fracture of Solids)
P. R. Okamoto (Electron-Beam Induced Solute Redistribution in Alloys)

A group of companies specializing in electron microscope equipment jointly provided funding for the 20 invited speakers. Several other companies supported "Frontiers" by advertising in the program book or purchasing exhibit tables.

Many of the papers truly presented the "frontiers" of electron microscopy, includ-

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