MRS BULLETIN

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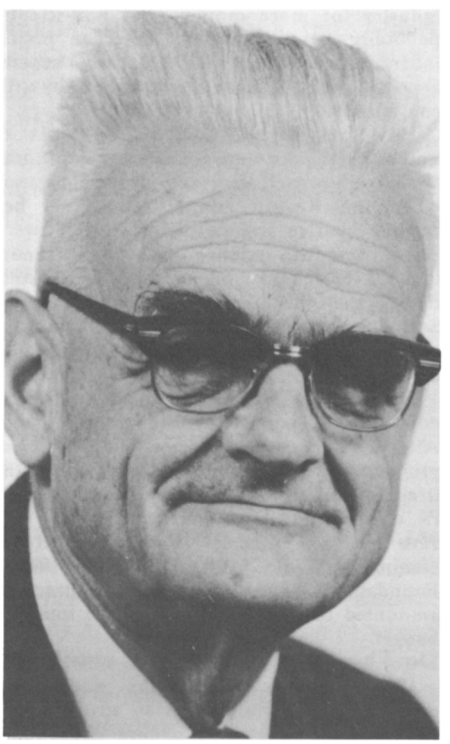
VON HIPPEL WINNER

Zener receives MRS's most prestigious award

The Materials Research Society is honored to bestow its 1982 Von Hippel Award on Clarence C. Zener, Emeritus University Professor at Carnegie-Mellon University. Zener will receive the award at a special presentation in Boston as part of the Society's annual meeting.

Zener's contributions to the physics of metals and to mathematics among the most fundamental and original of any 20th-century scientist. At once a brilliant theoretician and an enthusiastic experimenter, he performed the definitive work on internal friction in solids, and invented the Zener diode as part of a line of research that may be said to have laid the foundation for the development of semiconductors. At the same time, he made substantial contributions in many other areas, notably ferromagnetism. It is the breadth of Zener's work, as well as its exceptional depth, that led the MRS to select him for its prize.



Theory and application

Clarence C. Zener was born in Indianapolis in 1905. His first love was mathematics, in which he received his B.A. from Stanford in 1926. His developing interest in physics led him to take his Ph. D. in that discipline from Harvard University in 1929. A brilliant student, he was awarded academic fellowships in Germany (1929-30), at Princeton University (1930-32) and at England's Bristol University, to which he traveled in 1932.

It was at Bristol, scarcely out of school, that Zener began to perform the work in internal friction that established his reputation as one of the boldest thinkers in physics. John K. Hulm, director of research for Westinghouse and a friend of Zener's for more than 30 years, pointed out in a telephone interview, "This was a time when the theory of solids was

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ZENER GIVEN VON HIPPEL PRIZE

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just being put on a quantitative basis. This was very early work."

Zener's achievement was two-fold. On the one hand, he developed the theoretical models that would explain the causes of internal friction in solids, particularly metals. He designed many of the experimental programs necessary to verify his hypotheses and, with such distinguished collaborators as Nobel laureate Neville Mott and Harry Jones, carried the experiments out. On the other hand, he then applied his own theoretical work to the design and engineering of the most original application of this work, the Zener diode.

"Clarence is really a *brilliant* physicist," Hulm said. "There are so many causes of internal friction--it is influenced by things like metallic defect, grain boundaries and dislocations, vacancies--and he essentially untangled all the various factors and calculated their influence, and in various experimental programs with his co-workers he verified much of the theory."

Classroom and laboratory

Despite his insatiable interest in laboratory work, Zener in 1935 accepted the first of a series of academic appointments that have implanted in generations of his students a relish for theory *and* application--and have created a network of lasting friendships that transcend boundaries of age, discipline and nationality.

Zener was a member of the physics faculty of Washington University in St. Louis, City College of New York and, when the Second World War broke out, Washington State University. In 1942 he joined the Watertown, Mass., Arsenal, becoming principal physicist there. For his war-time contribution, the War Department bestowed on him its Exceptional Civilian Service Award. In 1945 he was appointed professor of physics at the University of Chicago.

In 1951 Zener joined Westinghouse to lead the expansion of its basic research program, becoming director of the laboratories in 1957. In his fifteen years with Westinghouse he built a staff and a research institution among the best in the world, while at the same time continuing his own research, which has ranged from atomic physics and dielectric breakdown to solid state diffusion, the thermodynamics and kinetics of metallurgical transformations, plastic deformation and the invention of geometric programming.

Texas A&M called Zener back to academia in 1966, appointing him Dean of Science. Two years later, he was persuaded to return to Pittsburgh as University Professor at Carnegie-Mellon.

When Zener was nominated for the Society's Von Hippel Award, "the reaction was electric," said H.J. Leamy, MRS first vice president. "Zener's work is so broad, so profound, so much the embodiment of what the award represents to us--we were very excited and, when we learned he would accept the award, very honored."

The author of more than 125 papers and books in addition to his famous monograph on internal friction, Zener has received the Bingham Award of the Society of Rheology, the Wetherill Medal of the Franklin Institute, and the Albert Souveur Achievement Award and the Gold Medal of the American Society for Metals. He is a fellow of the American Physical Society and a member of the National Academy of Science.

PROFILE OF CLARENCE ZENER

"Those of us who know Clarence regard him as a great man," said Carnegie-Mellon University Institute Professor William W. Mullins, a long-time friend and colleague. As evidence of Zener's wide-ranging intellect he noted that, "To assess his contributions, it is necessary to consult a number of scientists in different fields."

As much as Clarence Zener is revered by his students and fellow scientists for the originality of his thinking, he is loved by his friends for his self-effacing grace. "You get very emotional about Clarence and Ruby [his wife of more than 50 years]," said Westinghouse's research director, John K. Hulm. "Let me tell you a story about them.

"When I was going over to Chicago in 1949 [like Ruby Zener, Hulm is English], we'd just had a baby and when we thought about Chicago we thought about, you know, gangsters and so on. I mean, we knew nothing about where we were going to live.

"Then we got this letter from Ruby, to my wife. Now, Zener wasn't even my sponsor; my sponsor was Prof. Long, a chemist. But we were all together at the Institute for the Study of Metals, and Clarence was the resident theoretician.

"Ruby's letter said, 'Don't worry; we've found an apartment for you, we'll have a crib for the baby.' The Zener's rented that apartment with their own money; they lent us the crib. . . ."

Hulm remarked he had visited the Zener's a few days before this interview on their farm outside Pittsburgh. He said Zener described with animation the latest research he was pursuing. "He's as active today as he was 30 years ago," Hulm said. "He hasn't given up one jot."

"He's simply a wonderful man, tremendously stimulating to be with. His wife happens to be the same. Clarence and Ruby together," Hulm reflected, "they're simply the world's greatest people."

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