

## Acceptance of the Mineralogical Society of America Award for 1999

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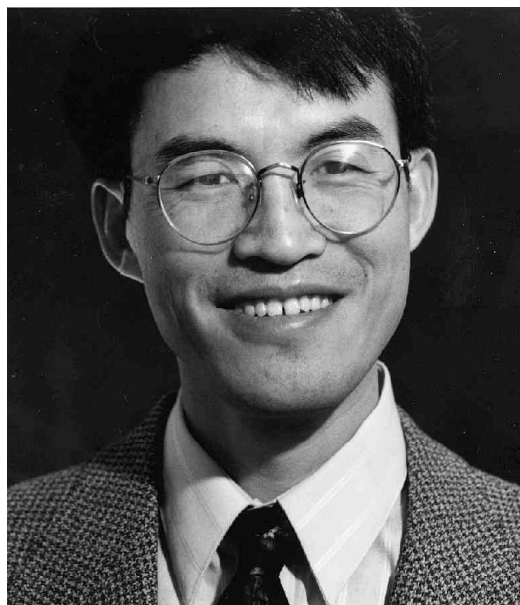
Mr. President, Members of the society, and guests:

It is a great honor to be the recipient of this year's MSA award. It has been a long journey for me from a high school graduate in China who spoke no English to a young scientist recognized by my good friends and colleagues of the MSA. I could not have completed this journey without the help of many distinguished scientists and the opportunities created for me at different times and places.

The year I graduated from high school was the second year after the reform of the Chinese education system that allowed students to enter college based solely on the accumulative score of their national entry exams. I was fortunate enough to become a student in the Department of Geology at Zhejiang University, one of the prestigious universities in China. During my last year in college, I was assigned to do a senior thesis at the Institute of Geochemistry, Academia Sinica, where Lin Chuanxian introduced me to geological problems that can be solved by thermodynamic calculations. The following year, I went back to the Institute of Geochemistry as a special graduate student after I received a fellowship from the Chinese Education Ministry that allowed me to pursue a Ph.D. degree abroad. While I applied for graduate schools in the United States, I worked with Xie Xiande who opened the mineral physics door for me. I was convinced that thermodynamics and mineral physics were the future of petrology and mineralogy. I decided to pursue a career in these fields.

It was not easy to find a graduate advisor in the United States with limited access of information back in the early 1980s. The *American Mineralogist* journal was my main source of information, including a list of previous recipients of the MSA award. Among several choices of schools, I finally decided to work with Surendra Saxena at Brooklyn College, the City University of New York. Surendra taught me not only how to conduct scientific research but also how to enjoy a variety of ethnic foods in New York City. He was always looking after me. He introduced me to his friends and colleagues whenever it was possible and broadened my view of the scientific community. To provide me with opportunities in both theoretical modeling and experimentation, Surendra invited Alex Navrotsky and Bob Liebermann to serve on my thesis advisory committee. The interactions with Alex at Princeton and Bob and his colleagues at Stony Brook certainly enriched my perspective of the experimental world.

In the beginning of my fifth year at Brooklyn, I was en-



couraged to explore the experimental world. During the 1988 Spring AGU meeting at Baltimore, I visited Dave Mao at the Geophysical Laboratory. Dave showed me around the Lab and the D.C. area and shared his homemade wine with me. The people and the facilities at the Lab impressed me. I joined the Lab as a predoctoral fellow that summer.

During my predoctoral days, I learned basic experimental techniques used by petrologists from Bjorn Mysen and the diamond cell technique from Dave. I also had the opportunity to use the multi-anvil apparatus at SUNY Stony Brook. With my theoretical modeling background, I knew exactly what experimental data were crucial for improving my thermodynamic model. It was like I suddenly found a unique tool to obtain clues for a partially finished word puzzle.

My predoctoral experience was very satisfactory because of the Lab's extraordinary environment and the first-rate scientists who were willing to give counsel. My experimental work on phase equilibria in the system MgO-FeO-SiO<sub>2</sub> added a new dimension to my thermodynamic model-based thesis.

I returned to the Lab in the summer of 1989 as a Carnegie postdoctoral fellow. It was an exciting time for high-pressure research because of the possibility of combining the capacity of synchrotron radiation with that of the diamond cell and the renewed interest to develop large-volume multi-anvil apparatus in the United States. It is a great privilege to work with Dave Mao who has a clear vision of the future and extraordinary skill and energy to make things happen. Our most fruitful collaboration is the development of an externally heated diamond cell that allowed us to explore a new range of pressure and temperature conditions. Combined with synchrotron radiation, we were able to obtain X-ray diffraction data of FeO at 96 GPa and 800 K, and revealed the NiAs structure of the high-pressure phase of FeO. The new techniques also allowed us to study phase transitions and determine phase boundaries at high pressures and moderate temperatures (up to 1100 K) by in situ measurements, and to obtain  $P$ - $V$ - $T$  equations of state for mantle and core related minerals.

The establishment of the NSF Center for High Pressure Research (CHiPR) in the early 90's provided me with new opportunities. In addition to the diamond cell work with Dave, I was interested in phase equilibrium study using multi-anvil apparatus. I frequently visited the high-pressure lab at SUNY Stony Brook and enjoyed the interactions with CHiPR members at Stony Brook. With support from CHiPR, Joe Boyd and I built the first multi-anvil apparatus at the Geophysical Lab in

1992. Now the multi-anvil high-pressure lab is equipped with three multi-anvil devices that are capable of generating pressures up to 28 GPa and temperatures above 2500 °C. Using these devices, we have conducted research projects on phase transformations in the Earth's and Martian mantles, including the nature of the 410 km and 660 km seismic discontinuities, stability of dense hydrous silicates in a subducted slab, and the mineralogy of the Martian interior.

I have enjoyed the complete freedom of research, and relaxed but competitive environment at the Lab. I am deeply grateful to Charlie Prewitt who gave me a job at the Lab and supported my research program when he was the Lab's director. I want to thank all of my colleagues who have helped me in different ways.

Finally, I would like to thank my wife Connie Bertka. It is she who instructed me on the use of the piston-cylinder when we both were predoctoral fellows at the Lab. It is she who introduced me to the planetary science community. It is she who edited many of my manuscripts. In recent years, we have collaborated on several research projects that resulted in a number of publications including a co-edited book on mantle petrology published by the Geochemical Society. The result of our most recent collaboration is our eleven-month daughter Jennifer Yanxing. So I must say that at least half of this award belongs to my wife.

Again, I would like to thank the Society for this honor.