

Presentation of the Mineralogical Society of America Award for 1999 to Yingwei Fei

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Mr. President, members of the Society, and guests:

I am pleased to present my friend and colleague, Yingwei Fei, as this year's recipient of the Mineralogical Society of America Award.

Fei, as he is known to all of us, received his undergraduate degree from Zhenjiang University in China, spent two years at the well-known Institute of Geochemistry in Guiyang, came to the USA for further training, and was awarded a Ph.D. degree from CUNY in 1989, working with Surendra Saxena. He spent a year as a Predoctoral Fellow at the Geophysical Laboratory before becoming a Postdoctoral Fellow and then the Norton Senior Fellow supported by a grant from the Norton Company. Because his academic and research records were so good, the Geophysical Laboratory offered him, and he accepted, a staff position beginning July 1, 1996.

Fei's Ph.D. research focused on the theoretical (or computational) aspects of basic thermodynamic properties of minerals and fluids. He came to the Geophysical Lab to learn about high-pressure experiments that would provide information to enlarge the thermodynamic database for mantle minerals. This was a very important undertaking, because thermodynamic properties of these materials under deep Earth conditions were and, to some extent, still are poorly understood, and ultimately can only be determined accurately by in-situ high-pressure experiments.

In a very short time, Fei mastered high-pressure diamond-cell, piston-cylinder, and large-volume multi-anvil techniques, and learned to use the essential analytical methods such as Mössbauer spectroscopy, Raman and infrared spectroscopy, and synchrotron-radiation X-ray diffraction. He is in charge of the Geophysical Laboratory multi-anvil laboratory. Together with Joe Boyd he designed and built a 1500 ton press with octahedral anvils that is being used for a variety of high-pressure experiments requiring a relatively large sample volume. He also designed a diamond-anvil cell that is capable of obtaining simultaneous pressures and temperatures up to 100 GPa and 1000 K and is using it to obtain diffraction data on oxides, silicates, and sulfides that are potential mantle phases. He was the first to publish a complete phase diagram for FeS and the first to confirm the high-pressure phase transition in FeO to the nickel arsenide structure. More recently, he discovered three new iron sulfide phases, Fe₃S₂, Fe₂S, and Fe₃S, that are stable only at

high pressure and may be more important than FeS when considering the phase chemistry and structure of the cores of Earth and other planets.

Fei has been a co-principal investigator with two staff members in the Department of Terrestrial Magnetism on NSF-funded grants, one for using the ion probe to study trace-element partitioning in high-pressure phases and the other to instrument a multi-anvil apparatus to detect acoustic emissions generated in phase transitions, as well as being a major participant in the Center for High Pressure Research and other Geophysical Laboratory projects. It is very unusual to find anyone with the command of such a wide array of experimental techniques and also a strong background in thermodynamics. Fei is using this background very successfully to attack fundamental problems in the petrology of Earth's deep interior and it is clear that he has many ideas that will bear exceptional fruit in the years to come.

Fei has become a leader, not only among his peers at the Geophysical Laboratory, but also on an international scale. He has participated in many national and international scientific meetings and workshops, and is co-editor with Connie Bertka and Bjorn Mysen of the just published *Geochemical Society Special Publication No. 6, "Mantle Petrology: Field Observations and High Pressure Experimentation, A Tribute To Francis R. (Joe) Boyd."*

Fei is also collaborating with his Geophysical Laboratory colleague (and spouse), Connie Bertka, in a team effort that is becoming widely known for original contributions to the petrology of the Martian interior, and one that should lead to a comprehensive program in comparative petrology of all the inner planets, truly a new frontier for petrologists.

Not only does Fei conduct an outstanding research program, he and Connie are major participants in Lab social activities and can always be counted on to help whenever a problem arises or something needs to be done. Fei exhibits great concern for the success of our summer interns, graduate students, and postdoctoral fellows alike and thus is an ideal mentor for young people just beginning their scientific careers. He is respected and supported by all his scientific colleagues and I know no one else more qualified to receive the MSA Award.

It is, therefore, my great pleasure and honor to present Yingwei Fei for the 1999 MSA Award. Ladies and gentlemen, please welcome Yingwei Fei!