

## Acceptance of the Mineralogical Society of America Award for 1981

ALEXANDRA NAVROTSKY

*Department of Chemistry  
Arizona State University  
Tempe, Arizona 85281*

### *Ladies and Gentlemen, Colleagues and Friends:*

It is indeed a pleasure and an honor to receive the MSA award. A glance at the list of past recipients is a humbling experience; so many have, in the years before and since their award, left a lasting imprint on science.

I have heard success defined as liking what you have to do. By that measure, I am undoubtedly successful, for I go to work almost every day with a sense of anticipation and discovery. Equally satisfying are the spirited discussions, friendly arguments, and continual excitement provided by colleagues, coworkers, and students. To me, initially trained as a physical chemist, and working actively in both solid state chemistry and geochemistry, recognition by the MSA is especially gratifying.

Since childhood I have been a naturalist, with amateur interests in plants, animals, minerals, prehistoric artifacts and their complex interactions. Thermochemistry may seem at first glance to be the domain of a hopelessly narrow specialist. A deeper look convinces me that the interrelations among thermodynamics, crystal structure, and atomic properties, as well as the relation of such fundamentals to broader questions in geology and materials science, offer unlimited opportunities to generalize and speculate. The balance between detailed data and unifying concepts, experiment generating hypothesis suggesting a dozen further experiments, is to me the joy of science. The present is an exciting time for mineralogy; we see so many new experimental methods and new interactions between diverse ways of thinking. It is a pleasure to be part of it.

To be more specific about areas close to my interests, I have seen geological thermodynamics change from a purely empirical macroscopic application of textbook physical chemistry to a discipline tied closely to crystal chemistry and chemical bonding. Concern about sample characterization has shifted from bulk chemical analysis to questions of



phase purity, homogeneity, structural detail, and order-disorder. The pressure-temperature realm of interest has expanded to include both cold dilute interstellar gas and the extremes of high pressure and temperature in the deep interior of planets. Should we tire of terrestrial mineral compositions, we can ponder the thermodynamics and phase relations of other members of the solar system. Technology has improved and simplified experimental measurements; the computer controls our experiments and massages our data. Using its power, we either drown in an ocean of parameters and regressions or leap to greater understanding of phenomena too complex for "back of the envelope" calculations.

Since writing research proposals accustoms one to predicting the future, I shall venture some guesses on the evolution of mineralogical thermochemistry. In addition to continuing its close ties to crystal chemistry, the field will make greater use of ideas and data originating in quantum mechanics and spectroscopy. Two areas which may be ripe for real advancement are the development of useful thermodynamic models for silicate melts and the detailed description of vibrations in complex crystals, in terms simple enough to be predictive yet complex enough to be accurate. The recognition of Susan W. Kieffer by MSA last year reflects both the impor-

tance of the second problem and her contributions to its solution.

Thanks are due to many people—to my family for their understanding, to Ole Kleppa, Bob Newton, Hermann Schmalzried and Arnulf Muan for their support and encouragement in my predoctoral and postdoctoral studies, to Arizona State University for helping me grow as both chemist and geologist, to John Holloway for sharing his lab and encouraging me to pursue geochemical problems, to Lane

Briley for building the calorimetry lab and keeping it running, to the many students and research associates who have produced both data and ideas, to my colleagues all over the world, and to the federal agencies and ultimately the taxpayer who have provided monetary support. It is indeed a luxury to do what one likes doing and be paid and praised for it. Once more, I wish to thank the MSA for this recognition. I shall strive to make the future better than the past, in my science and in all things.