Scientists and students interested in the field will undoubtedly benefit in having access to the book. Most of the papers give extensive references to recent articles dealing with the topics and there is a brief subject index at the end of the book. The book will certainly be used extensively by research workers, teachers and postgraduates interested in the different fields of crystal growth and surface science. It does undoubtedly offer a very extensive range of expertise.

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High-pressure research in geophysics. Advances in earth and planetary sciences 12. Edited by S. AKIMOTO and M. H. MANGHANI. Pp. ix + 632. Tokyo: Center for Academic Publications Japan and Dordrecht–Boston–London: Reidel, 1982. Price Dfl 260.00, US$113.00.

This book contains 45 papers submitted at the US–Japan Seminar held in January 1981 in Hakone (Japan) attended by 40 scientists from Japan, 21 from the United States and six from other countries.

The contributions were subdivided into seven sections: instrumentations and pressure calibration; elasticity, attenuation and rheology of the crust and upper mantle; mechanical properties and melting of the crust and upper mantle; geophysics and geochemistry of the mantle; high-pressure phase transformations and crystal chemistry; thermochemistry and crystal growth; shock-wave experiments.

Solving the problems which are important for our understanding of the interior of the earth has provided a strong impetus for the progressive development of super-high-pressure techniques. By the maximally achieved parameters and the standard of experimental research, geology often goes ahead of physics and chemistry in dealing with these problems.

Exceptionally good progress in instrumentation has been achieved by the creation of multi-anvil multi-stage presses and diamond-anvil cells; this is fairly well illustrated in this book.

S. Endo and E. Ito used sintered diamond anvils as the final stage of the multi-anvil apparatus which permitted them to measure the resistance of FeO, Al_2O_3 and CaO up to 60–80 GPa (600–800 kbar). E. Ohtani and collaborators have increased the range of operating temperatures up to 2800 K, and studied the melting of fayalite, forsterite and pyrope up to 20 GPa.

The diamond-anvil cell was improved by the use of external heating, with measurements of temperature by the broadening of ruby luminescence lines (O. Shimamura *et al.*), by the use of conical slit and solid-state detector (T. Yagi & S. Akimoto), energy-dispersive diffraction (W. B. Holzapfel, W. May), and synchrotron radiation (E. Skelton), which made it possible to decrease the exposure time in X-ray measurement by one–two orders of magnitude, and also by the development of a method for measuring the pressure–temperature by means of Au, Pt, and MgO standards (J. C. Jamieson *et al.*).

Owing to the techniques developed, it was possible to fix with fair accuracy the elastic constants for forsterite, n-H_2, n-D_2 and their pressure derivatives by Brillouin scattering (W. A. Bassett *et al.*; H. Simizu *et al.*); it was also possible to show the isostructural nature of the phase conversion of Fe_2O_3 at 55 GPa and its probable transition from high-spin to low-spin state, to show the change of structure from B_1 to B_2 type for CaO at 60 GPa (T. Yagi – S. Akimoto); to measure the thermochemical properties of the minerals stable at larger depths (H. Watanabe; A. Navrotsky *et al.*); to obtain some new AX_2-type polymorph modifications and find out generalized data on their crystal structures (L. Ming & M. H. Manghani; L. Liu). Of special interest for geologists are the equilibria in the system MgO–FeO–SiO_2, as based on the experimental data at 30–50 GPa, and petrologic mantle models (H. K. Mao *et al.*; E. Ito & H. Yamada; P. Shen *et al.*).

The concepts dealing with the mineral mantle composition may be diverse, as the dependence of the equilibrium assemblages on temperatures has so far been determined rather approximately and the formation of solid solutions with Al_2O_3, CaO and some other components may essentially change the entropy and phase volumes, resulting in their stability fields also becoming changed.

Experiments using the effect of shock waves on minerals make it possible to examine the temperature range up to about 3000 K which is unattainable by static runs; this has permitted the more accurate determination of the parameters of stishovite and Fe melting at pressures corresponding to the earth core boundary (T. Ahrens *et al.*; J. Brown & R. J. McQueen). Nine papers are devoted to a careful study of the mechanical and rheologic properties of rocks and minerals, kinetics of polymorphous transitions, and redox conditions existing at depth.

Some general problems of crystal chemistry such as the correlation between ion sizes and compression under pressure (C. T. Previtt), use of interatomic potentials and molecular dynamics to calculate thermodynamic properties at polymorphous transitions, and equilibria in the melts are discussed (R. Jeanloz; Y. Matsui *et al.*). M. Wakatsuki & K. Ichinose, H. Kanda & O. Fukunaga report some very interesting data dealing with control of nucleation processes so as to grow large and rather perfect diamond crystals (up to 3 mm), and they give a description of their morphology.

Most of the contributions contained in this book will be interesting not only for those working in the field of geophysics, but also for a wide circle of crystal chemists, high-pressure technologists and specialists on crystal growth.

In the *Preface* to this book S. Akimoto & M. Manghnani stress that the task of the editors was to maintain the high quality of the papers. One may note that this objective was fulfilled perfectly: all the work reported is at a high experimental and theoretical level and makes a valuable contribution to science and to high-pressure technology.

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