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- Book Details
- Geophysical Monograph Series
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## High-Pressure Research in Mineral Physics: A Volume in Honor of Syun-iti Akimoto

Vol. 39, 1987

③Table of Contents タブを選択します。

- Summary
- Table of Contents
- Cited By (0)

Manghnani, Muri H.; Syono, Yasuhiko

### Preface

pp. v-vi

[Abstract] | [Chapter] | [Full Text (PDF)]

Akimoto, Syun-iti

### High-pressure research in geophysics: Past, present and future

pp. 1-13

[Abstract] | [Chapter] | [Full Text (PDF)]

Fukunaga, O.; Yamaoka, S.; Akaishi, M.; Kanda, H.; Osawa, T.; Shimomura, O.; Nagashima, T.; Yoshikawa, M.

### Large-volume flat belt apparatus

pp. 17-28

[Abstract] | [Chapter] | [Full Text (PDF)]

Endo, S.; Toyama, N.; Ishibashi, A.; Chino, T.; Fujita, F. E.; Shimomura, O.; Sumiyama, K.; Tomii, Y.

### Determination of a $\alpha$ - $\beta$ transition pressure in Fe-V alloy

pp. 29-33

[Abstract] | [Chapter] | [Full Text (PDF)]

Seal, Michael

### Diamond anvil technology

Shimomura, Osamu; Kawamura, Takaaki  
**EXAFS and XANES study under pressure**  
 pp. 187-193  
[\[Abstract\]](#) | [\[Chapter\]](#) | [\[Full Text \(PDF\)\]](#)

Kanzaki, M.; Kurita, K.; Fujii, T.; Kato, T.; Shimomura, O.; Akimoto, S.  
**A new technique to measure the viscosity and density of silicate melts at high pressure**  
 pp. 195-200  
[\[Abstract\]](#) | [\[Chapter\]](#) | [\[Full Text \(PDF\)\]](#)

Wakatsuki, M.  
**Suppression of**  
 pp. 203-207  
[\[Abstract\]](#) | [\[Chapter\]](#) | [\[Full Text \(PDF\)\]](#)  
 ④章ごとの「Full Text (PDF)」をクリックしてフルテキストを表示します。

#### A NEW TECHNIQUE TO MEASURE THE VISCOSITY AND DENSITY OF SILICATE MELTS AT HIGH PRESSURE

M. KANZAKI and K. KURITA

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**Abstract.** A new method to measure viscosity and density of silicate melts at high pressure has been developed. With this method, the movement of the spheres falling within silicate melts that are contained in a high-pressure apparatus can be monitored in real time through an X-ray shadowgraph, and the settling velocity can be measured without quenching the charge. Because of the difference between the X-ray absorption coefficients of metal spheres and silicate melts, the image of the falling spheres can be clearly traced through an X-ray TV camera. The experiment was conducted with high-pressure and high-temperature apparatus (MAX80) using synchrotron radiation. The high intensity and the parallelism of the X-rays of synchrotron radiation and of the high-resolution Saticom X-ray TV camera allow accurate measurement of the falling velocity of the spheres, even for melts with low viscosity. With the present method, the measurable range of

indicate that the viscosity of most silicate magmas decreases with increasing pressure. This unexpected behavior at high pressure indicates that magmatic transport may be greatly enhanced in the earth's deep interior (KUSHIRO, 1986). Based on the ion dynamics calculation, ANGELL et al. (1982) determined that most ions in jadeite (NaAlSi<sub>3</sub>O<sub>6</sub>) melt have maximum mobilities at about 25 GPa. This suggests that the viscosity of jadeite melt decreases with increasing pressure but has a minimum value at some pressure. However, this finding has not yet been confirmed experimentally because of the limitation of the high-pressure apparatus used in previous experi-

se stability

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