



Joint symposium of Misasa 2019 & Core-Mantle Coevolution

**Origin, Evolution & Dynamics of the Earth &
Planetary Interiors**

Brancart Misasa Room 401 & 403

18th to 21st March

Program

18th March

9:30-9:35	X. Xue (IPM, director)	Opening remarks from IPM
9:35-9:40	T. Tsuchiya (CMC leader)	Opening remarks from Core-Mantle Coevolution

Session 1: Geoneutrino

Chairman: H. Kagi

9:40-10:20 O. Šrámek (Charles Univ.) Invited talk

Geoneutrinos and radiogenic power in the Earth: recent advances and future prospects

10:20-10:40 W.F. McDonough (Tohoku Univ.)

W.F. McDonough*, B. Roskovec, O. Šrámek

In search of recycled continental crust in the Mantle Transition Zone using geoneutrino measurements

10:40-11:00 H. Tanaka (ERI, U. Tokyo)

Restriction of the Core-Mantle Chemical Composition with Neutrino Observations

Coffee break

Chairman: J.-F. Lin

11:20-11:40 M. Yamano (ERI, U. Tokyo)

M. Yamano*, H. Hamamoto, A. Tanaka, S. Goto, T. Matsumoto

Re-evaluation of surface heat flow data in Japan for better estimation of the temperature distribution in the crust.

11:40-12:00 H. Watanabe (Tohoku Univ.)

Development of New Technology for Geo-neutrino Directional Measurement

Lunch and Poster

Session 2: Geochemistry and Petrology

Chairman: E. Takahashi

14:00-14:40 M.J. Walter (Geophys. Lab. Carnegie Inst.) Invited talk

M. Walter*, J. Drewitt, H. Zhang, S. McMahon, D. Edwards, B. Heinen, O. Lord, S. Anzellini, A. Kleppe

The fate of carbonate in oceanic crust subducted into earth's deep mantle

14:40-15:00 S. Aoyama (Niigata Univ.)

S. Aoyama*, T. Oneyama, W. Ouchi, Y. Ueno, M. Satish-Kumar

Multiple sulfur isotopes constraints on the origin of sulfide sulfur in Archean granitoids from Dharwar craton, Southern India

15:00-15:20 M. Satish-Kumar (Niigata Univ.)

M. Satish-Kumar*, S. Aoyama

Recent developments in stable isotope measurements on high-pressure high-temperature experimental run products and natural samples

15:20-15:40 K. Fukuyama (Univ. Tokyo)

K. Fukuyama*, H. Kagi, T. Inoue, Y. Sano, T. Shinmei, S. Kakizawa, N. Takahata, S. Hishita

Investigation of nitrogen incorporation into stishovite using implanted sample and outlook on deep nitrogen cycle

Coffee break

Chairman: R. Nomura

16:00-16:20 S. Tateno (ELSI, Tokyo Tech.)

S. Tateno*, H. Ozawa, K. Hirose, T. Suzuki

Fe₂S: the most iron-rich Fe-S compound at pressures of the inner core

16:20-16:40 K. Suzuki (JAMSTEC)

A. Takamasa, K. Suzuki*, Y. Fukami, T. Iizuka

High precision tungsten isotope of ocean island and LIPS basalts from deep mantle

16:40-17:00 H. Sumino (Univ. Tokyo)

H. Sumino*, T. Tanaka, H. Kuwahara, S. Kishi, R. Nomura, K. Mibe, C. Jackson, S. Tateno, H. Kagi

Noble gas partition between metal-silicate melts

17:00-17:20 T. Tsuchiya (GRC, Ehime Univ.)

T. Tsuchiya*, A. Ohba, Z. Xiong

Ab Initio Applications to the Element Partitioning between Core and Mantle

19th March

Chairman: T. Okuchi (IPM)

9:00-9:40 T. Nakagawa (Univ. Hong Kong) Invited talk

On theoretical and numerical modeling of the core-mantle thermal-chemical coupling: Review and perspective view

Session 3: water

9:40-10:00 X. Xue (IPM, Okayama Univ.)

Hydrogen incorporation mechanisms in nominally anhydrous mantle minerals: NMR spectroscopy and first-principles calculation

10:00-10:20 N. Prejzav (IPM, Okayama Univ.)

N. Prejzav*, T. Okuchi, N. Tomioka, X. Wang, C. Hoffmann

Probing hydrogen by single-crystal neutron diffraction in deep mantle hydrous minerals

Coffee break

Chairman: A. Suzuki

10:40-11:00 J. Tsuchiya (GRC, Ehime Univ.)

J. Tsuchiya*, K. Umemoto

First principles determination of the dissociation boundary of phase H (MgSiO_4H_2) and possible existence of ice VII at lower mantle conditions

11:00-11:20 H. Fei (BGI)

H. Fei*, T. Katsura

High water solubility of ringwoodite at mantle transition zone temperature

11:20-11:40 S. Yamashita (IPM, Okayama Univ.)

In situ vibrational spectroscopy of the dehydration of talc in the system $\text{MgO-SiO}_2\text{-H}_2\text{O}$

11:40-12:00 T. Ohashi (Tohoku Univ.)

T. Ohashi*, T. Sakamaki, K. Funakoshi, M. Muranushi, C. Shito, Y. Shibasaki, A. Suzuki

Structures of hydrous sodium silicate melts under high pressure and high temperature

Lunch and Poster

Headquarter business meeting (Room 503 Juraku)

Session 4: Transport properties

Chairman: K. Kawai

14:00-14:40 A.R. Thomson (UCL) Invited talk

A.R. Thomson*, S.A. Hunt, J. Van Driel, J.P. Brodholt, D.P. Dobson

Simultaneous deformation of Calcium Perovskite and Pyrope

14:40-15:00 Y. Nishihara (GRC, Ehime Univ.)

Y. Nishihara*, S. Doi, D. Yamazaki, N. Tsujino, T. Yoshino, T. Kubo, M. Imamura

D111-type apparatus for high-pressure deformation experiments and its application to a rheological study of hcp-iron

15:00-15:20 N. Tsujino (IPM, Okayama Univ.)

N. Tsujino*, D. Yamazaki, Y. Nishihara

Creep strength of bridgmanite

15:20-15:40 S. Azuma (ELSI, Tokyo Tech.)

S. Azuma*, R. Nomura, K. Uesugi, Y. Nishihara, S. Doi, T. Arimoto, T. Irifune

Update of the rotational diamond anvil cell and deformation microstructures of lower mantle materials

Coffee break

Chairman: Y. Nishihara

16:00-16:20 S. Ritterbex (GRC, Ehime Univ.)

S. Ritterbex*, T. Tsuchiya

Ab-Initio Investigation of Iron Self-Diffusion: Implications for the Plasticity of Earth's Inner Core

16:20-16:40 K. Kawai (Univ. Tokyo)

K. Kawai*, A. Borgeaud, Y. Suzuki

Imaging subducted slabs in the mantle from inversion of seismic waveforms

16:40-17:00 H. Gomi (IPM, Okayama Univ.)

H. Gomi*, T. Yoshino

Electrical resistivity and thermal conductivity of fcc Fe: Implications for the Mercury's core

17:00-17:20 K. Miyanishi (Osaka Univ.)

K. Miyanishi*, N. Ozaki, S. Ohmura, M. Harmand, A. Krygier, T. Nishikawa, Y. Umeda, K. Shigemori, Y. Sakawa, T.

Sano, R. Kodama

Study on transport properties of liquid iron and iron alloy under high temperature and high pressure using the laser shock technique

17:40-18:00 Signing ceremony

Agreement of cooperation between the Geophysical Laboratory Carnegie Institution for Science and

Institute for Planetary Materials, Okayama University

18:30-20:30 Banquet (entry required)

20th March

Session 5: Seismic observation and properties

Chairman: K. Ohta

9:00-9:40 D. Mainprice (Univ. Montpellier) Invited talk

Deformation, crystal preferred orientations, and seismic anisotropy in the Earth's D" layer

9:40-10:00 S. Tanaka (JAMSTEC)

Azimuthal anisotropy in the lowermost mantle beneath Philippine from ScS-S travel times

10:00-10:20 N. Takeuchi (ERI, Univ. Tokyo)

S.K. Roy, N. Takeuchi*, D. Srinagesh, M. Ravi Kumar, H. Kawakatsu

Topography of the western Pacific LLSVP constrained by S wave multipathing

Coffee break

Chairman: H. Terasaki

10:40-11:00 K. Ohta (Tokyo Tech.)

K. Ohta*, A. Hasegawa, T. Yagi, Y. Okuda, K. Onga, K. Hirose, Y. Ohishi

Measurements of high pressure-temperature thermal conductivity of the Earth's lower mantle minerals in a laser-heated diamond anvil cell

11:00-11:20 H. Terasaki (Osaka Univ.)

H. Terasaki*, I. Yamada, A. Kamiya, R. Tsuruoka, T. Kondo, Y. Higo, A. Machida

Sound velocity of liquid Fe-Ni-S-Si under pressure

11:20-11:40 Y. Nakajima (Kumamoto Univ.)

Y. Nakajima*, D. Kinoshita, Y. Kuwayama, K. Hirose, A. Iwamoto, S. Tateno, D. Ishikawa, A.Q.R. Baron

Sound velocity of liquid Fe-P alloy under high pressure based on inelastic X-ray scattering measurements

11:40-12:00 T. Irifune (GRC, Ehime Univ.)

Sound velocities of CaSiO₃ perovskite ("breyite") and some implications for chemical compositions around the 660 km discontinuity.

Lunch and Poster

Misasa joint-use research Session 1

Chairman: T. Katsura

14:00-14:40 J.F. Lin (Univ. Texas) Invited talk

Internally-consistent multiple constraints on the mineralogy and seismology of Earth's lower mantle

14:40-15:00 T. Okuchi (IPM)

Nanoscale texture and transformation timescale of dense Mg_2SiO_4 polymorphs in shocked meteorites: comparison between natural occurrences by high-resolution TEM and experimental results by fast XFEL diffraction

15:00-15:20 M. Kanzaki (IPM)

Low-frequency micro-Raman spectroscopy: applications to mineral sciences

Coffee break

Chairman: D. Yamazaki

15:40-16:00 B. Zhang (CAS)

B. Zhang*, T. Yoshino, C. Zhao

The effect of water on Fe-Mg interdiffusion rates in ringwoodite and implications for the electrical conductivity in the mantle transition zone

16:00-16:20 N. Chertkova (GRC, Ehime Univ.)

N. Chertkova*, S. Yamashita, H. Ohfujii, T. Irifune, H. Kadobayashi, Y. Yamamoto

Probing basalt- $5.75\text{H}_2\text{O}$ - CH_4 system by *in situ* vibrational spectroscopy

16:20-16:40 Y. Zhang (IPM)

Y. Zhang*, T. Yoshino, A. Yoneda, M. Osako

Effect of iron content on thermal conductivity of olivine with implications for cooling history of rocky planets

Session: Development of high-pressure technique

16:40-17:00 I.C. Ezenwa (IPM, Okayama Univ.)

I. C. Ezenwa*, T. Yoshino

Measurement of T -dependent electrical resistivity of solid and liquid Fe and Pt at fixed P

21st March

Misasa joint-use Session 2

Chairman: T. Yoshino

9:00-9:40 E. Takahashi (GIG) Invited talk

E. Takahashi*, S. Gao, J. Wang, L. Li

Melting process in Hawaii plume: Report from large volume multi-anvil laboratory in Guangzhou Institute of Geochemistry

9:40-10:00 N. Tsuchiya (Iwate Univ.)

N. Tsuchiya*, D. Yamazaki

Silicic melt formed by a partial melting experiment of mantle peridotite reacted with slab melt

10:00-10:20 Y. Nakamura (AIST)

Y. Nakamura*, T. Yoshino, M. Satish-Kumar

Pressure dependence of graphitization: Implications for rapid recrystallization of carbonaceous material in Earth's crust

Coffee Break

Chairman: H. Gomi

10:40-11:00 K. Fujita (Osaka Univ.)

Y. Haraguchi, T. Yoshino, S. Yamashita, M. Nakamoto, M. Suzuki, K. Fujita*, T. Tanaka

Electrical Conductivity Measurement of rhyolite and andesite glasses

11:00-11:20 Y. Mori (Okayama Univ. Sci.)

Y. Mori*, N. Nakano, T. Yoshino

The Measurement of Seebeck coefficient under Pressure using Six-axis Multi-Anvil Press

11:20-11:40 C. Zhao (IPM)

Redox kinetics of olivine revealed by diffusion profile of oxygen fugacity and its implication to the redox evolution of the uppermost mantle

11:40-12:00 T. Yoshino (IPM)

T. Yoshino*, W. Sun, C. Zhao, N. Sakamoto, H. Yurimoto

Electrical conductivity of hydrous olivine: revisited by various approaches

Lunch and Poster

Misasa joint-use Session 3

Chairman: N. Tsujino

14:00-14:40 T. Katsura (BGI, Univ. Bayreuth) Invited talk

T. Katsura*, H.-F. Fei, D. Druzhbin

H₂O-enhanced ionic conductivity of olivine

14:40-15:00 L. Xie (BGI, Univ. Bayreuth)

L. Xie*, K. Nishida, T. Ishi, C. Artem, B. Dimitry, T. Katsura

Simultaneously generation of ultra-high pressure and high temperature by combining boron-doped diamond heater and sintered diamond anvils.

15:00-15:20 D. Yamazaki (IPM)

High pressure generation in the Kawai-type multianvil apparatus

15:20-15:30 X. Xue (IPM, director) Closing remarks

16:30-17:30 A. Yoneda (IPM)

The last lecture (in Japanese with English slides)

Poster

A01

1. A. Okamoto*, T. Hiraga

Viscosity of Lower Mantle Estimated from the Common Diffusivity of Creep and Grain Growth

2. T. Kubo*, M. Imamura

Grain growth textures and kinetics in pyrolytic and basaltic materials under lower mantle conditions

3. R. Sinmyo

Technical development toward understanding the melting temperature of the materials at high pressure using ultra-fast spectroradiometry

4. T. Sakai

Pressure scales at multi-megabar pressure

5. M. Nishi*, K. Yamamoto, Y. Zhou, T. Irifune

Polycrystalline diamond sintered from ultradispersed nanodiamonds

6. Y Higo*, T Irifune

Development of ultrasonic measurement technique toward whole lower mantle conditions

7. T. Inoue*, M. Noda, S. Kakizawa, T. Kuribayashi, A. Sano, T. Hattori

Importance of various Al substitutions in bridgmanite

8. A. Suzuki

Stability field of hydrous aluminosilicates from the mantle transition zone to the shallow part of the lower mantle

9. H Kagi*, T. Kubo, A. Shinozaki, T. Okada, H. Ohfuji, A. Nakao

Reaction between forsterite and nitrogen fluid at high pressure and high temperature

A02

10. R. Iizuka-Oku*, H. Gotou, K. Fukuyama, H. Kagi

Behavior of light elements in the early stage of Earth's evolution: In-situ high-pressure and temperature

11. T. Kuribayashi*, Y. Zhou, T. Irifune, H. Ohfuji

Structural study on new high-pressure forms of Al_2SiO_5

12. S. Tateno*, T. Komabayashi, K. Hirose

Static compression of B2 KCl to 230 GPa and its P - V - T equation of state

13. S. Itoh

Quantitative analysis from stigmatic isotope imaging of SIMS

14. T. Kogiso*, N. Akizawa

Controlling factor of whole-rock PGE concentrations in mantle peridotite

15. F. Maeda, Y. Horioka, S. Kamada*, S. Aoyama, S. Ozawa, M. Satish-Kumar, A. Suzuki

Sulfur and carbon isotope fractionation under mantle conditions

16. N.M. Kondo*, T. Kogiso

Major element composition of the Hadean crust: constraints from Sm-Nd isotope systematics and high-pressure melting experiments

A03

17. S. Tanaka*, W. Siripunvaraporn, S. Boonchaisuk, S. Noisagool, K. Kawai, Y. Suzuki, T. Kim, Y. Ishihara, H.

Kawakatsu, N. Takeuchi, K. Miyagawa, R. Iritani

Completion of the seismic observation with Thai Seismic Array (TSAR)

18. S Kaneshima

S-to-P scattering in the lower mantle near subduction zones

19. M. Matsushima

Core-mantle interaction inferred from a core surface flow model

20. Y. Yamamoto*, H. Fukami, W. Taniguchi, P.C. Lippert

Variation of the intensity of the paleomagnetic field during 38-50 Ma deduced from the marine sediments recovered from the northwest Atlantic

21. M. Obayashi*, T. Miyoshi, J. Yoshimitsu

Toward adjoint tomography of the large low seismic velocity provinces beneath the western Pacific Ocean

22. G. Hao

Using S-P wave search the depth of mantle 660-discontinuity beneath Kuril Region where subduction slab do not exist

23. R. Iritani*, H. Kawakatsu, N. Takeuchi

Sharpness of the hemispherical boundary in the inner core beneath the northern Pacific

24. K. Minami, K. Ueki*, T. Iizuka, S. Enomoto, H.K.M. Tanaka

Sample-scale geochemical variation of the Inada granitic body, Ibaraki, Japan -toward the reduction of geoneutrino flux estimation errors-

A04

25. H. Dekura*, T. Tsuchiya

Ab initio anharmonic lattice dynamics for Fe-bearing lower mantle minerals

Misasa

26. T. Moriguti*, A. Yoneda, E. Ito
Melting phase equilibrium relations in MgSiO₃-SiO₂ system under high pressures
27. M. Sakurai*, N. Tsujino
Pressure effect on IR spectra of anhydrous minerals
neutron diffraction measurements on iron-silicate-water-sulfur system
28. L. Guan*, D. Yamazaki
Lattice preferred orientation of akimotoite and mid-mantle anisotropy in subduction zones
29. H. Yusa*, N. Hirao, Y. Mori, Y. Ohishi
Latest remodeling of multi-axis DAC system for radial XRD experiments
30. Y. Yachi*, T. Kunihiro, E. Nakamura
DREAM & Its applications: Software for Management of Samples and Data
31. M. Osako*, A. Yoneda
Measurement of thermal conductivity and thermal diffusivity for mantle minerals by the pulse heating method
32. A. Yoneda*, S. Kobayashi, S. Kamada
GHz ultrasonic velocity measurement in diamond anvil cell
33. N. Noguchi*, Y. Fujii, T. Saitoh, H. Okamura
High-pressure synthesis of doped black phosphorous
34. R. Wang*, T. Yoshino
Electrical conductivity of diasporite, δ AlOOH and ϵ FeOOH
35. C. Liu*, T. Yoshino¹
Intrinsic attenuation factor Q of partially molten Fe-S-O system