

Sat. Sep 16, 2023

Oral presentation | S1: Dynamics of igneous processes (Special Session)

9:00 AM - 10:00 AM JST | 12:00 AM - 1:00 AM UTC | 820 Sugimoto Campus

S1: Dynamics of igneous processes (Special Session)

Chairperson: Morihisa Hamada (JAMSTEC), Shumpei Yoshimura (Hokkaido University)

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[S1-01] Dehydration and heating processes during magma transportation decoded from chemical zonings in peridotite xenolith from Ichinomegata, NE Japan

*Yuto SATO¹, Eiichi Takahashi¹, Kazuhito Ozawa² (1. GIGCAS, 2. AORI, Univ. Tokyo)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[S1-02] **Post-entrapment density modification of fluid inclusions by elastic deformation: Implications for fluid inclusion geobarometry of peridotites***Yuuki HAGIWARA¹, Ross John Angel², Junji Yamamoto³, Rosario Esposito⁴, Matteo Alvaro⁵ (1. JAMSTEC, 2. IGG-CNR, 3. Kyushu University, 4. University of Milano-Bicocca, 5. University of Pavia)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[S1-03] Textural and chemical changes of alkali feldspar during disequilibrium melting of granite

*Hiroshi KAWABATA¹, Shigeru YAMASHITA² (1. Kochi University, 2. Okayama University)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[S1-04] Experimental simulation of crystallite and spherulite in rhyolitic lava

*Tamotsu Sugawara¹, Shumpei Yoshimura¹ (1. Hokkaido Univ. Sci.)

[zoom] Zoom

Oral presentation | R5: Extraterrestrial materials

9:00 AM - 12:00 PM JST | 12:00 AM - 3:00 AM UTC | 821 Sugimoto Campus

R5: Extraterrestrial materials

Chairperson: Megumi Matsumoto, Daiki Yamamoto, Yusuke Seto, Shogo Tahibana

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[R5-01] Shock deformation microstructures in rutile

*Yuhei Umeda¹, Yuma Nagai¹, Naotaka Tomioka², Toshimori Sekine³, Masashi Miyakawa⁴, Takamichi Kobayashi⁴, Hitoshi Yusa⁴, Takuo Okuchi¹ (1. Kyoto Univ. KURNS., 2. JAMSTEC, 3. HPSTAR, 4. NIMS)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[R5-02] Microstructures of calcite deformed by 3-D shock experiments

*Naotaka TOMIOKA¹, Kosuke Kurosawa², Haruka Ono³, Takafumi Niihara⁴, Takafumi Matsui² (1. KOCHI, JAMSTEC, 2. PERC, Chiba Inst. Tech., 3. Res. Org. Sci. Tech., Ritsumeikan Univ., 4. Dept App. Sci., Okayama Sci. Univ.)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[R5-03] FIB-TEM observation of silica minerals coexisting in achondrites

*Atsushi TAKENOUCHI¹, Youhei Igami², Akira Miyake², Haruka Ono³, Takashi Mikouchi⁴, Akira Yamaguchi⁵ (1. The Kyoto Univ. Museum, 2. Kyoto Univ., 3. Ritsumeikan Univ., 4. The Univ. Museum, The Univ. of Tokyo, 5. Natl. Inst. of Polar Res.)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[R5-04] Assessment of Shock Melting of Martian Meteorites as Deduced from Short Time Heating Experiments of Basalt and Martian Soil Simulants[\[Presentation award entry\]](#)

*Takeru Sato¹, Takashi Mikouchi² (1. Univ. of Tokyo, 2. Univ. of Tokyo)

10:00 AM - 10:15 AM JST | 1:00 AM - 1:15 AM UTC

[R5-05] Observation of internal structure of diamond in carbon grains in DaG 999 ureilite.

*Masahiro YASUTAKE¹, Megumi Matsumoto³, Junya Matsuno², Akira Tsuchiyama^{2,4}, Kentaro Uesugi¹, Akihisa Takeuchi¹ (1. JASRI, 2. Ritsumeikan Univ., 3. Tohoku Univ., 4. CAS/GIG)

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[3Lecture-201-11-6add] 休憩

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[R5-07] Nano-CT and TEM analysis of impact melt splashes and microcraters on asteroid Ryugu samples

*Megumi MATSUMOTO¹, Junya Matsuno², Akira Tsuchiyama^{2,3}, Tomoki Nakamura¹, Yuma Enokido¹, Mizuha Kikui¹, Masahiro Yasutake⁴, Kentaro Uesugi⁴, Akihisa Takeuchi⁴, Satomi Enju⁵, Shota Okumura⁶, Itaru Mitsukawa⁶, Sun Mingqi³, Akira Miyake⁶, Hayabusa2 initial analysis core-team (1. Tohoku Univ., 2. Ritsumeikan Univ., 3. GIG, CAS, 4. JASRI, 5. Ehime Univ., 6. Kyoto Univ.)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[R5-08] Origins of olivine grains in CI chondrites and asteroid Ryugu samples as inferred from their major and minor element compositions

*Takashi MIKOUCHI¹, Hideto Yoshida¹, Minami Masuda¹, Michael E. Zolensky² (1. Univ. of Tokyo, 2. NASA/JSC)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[R5-09] On the relationship between modal abundances of minerals and degrees of aqueous alteration of the brecciated fragments in the Orgueil CI chondrite

*Minami Masuda¹, Takashi Mikouchi², Michael Zolensky³ (1. UTokyo Sci., 2. UTokyo UMUT/Sci., 3. NASA JSC)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[R5-10] Mineralogical diversity of the C1 lithologies in the Kaidun meteorite[\[Presentation award entry\]](#)

*Kenei OGIYA¹, Takashi Mikouchi², Michael E Zolensky³ (1. Univ. of Tokyo, 2. Univ. of Tokyo, 3. NASA)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[R5-11] Classification of subtype 3.0 chondrites

Program

2023 Annual Meeting of Japan Association of Mineralogical Sciences (JAMS)

*Makoto Kimura¹, Michale K. Weisberg², Akira Yamaguchi¹ (1. National Institute of Polar Rsearch, 2. City University of New York)

[zoom] Zoom

Oral presentation | R3: High-pressure science and deep Earth's material

9:00 AM - 12:00 PM JST | 12:00 AM - 3:00 AM UTC | 822 Sugimoto Campus

R3: High-pressure science and deep Earth's material

Chairperson: Takaaki Kawazoe (Hiroshima University), Takeshi Sakai (Ehime University), Masayuki Nishi (Osaka University)

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[R3-01] First-principles investigations of the polysomatism of antigorite under pressure

*Jun TSUCHIYA¹, Sayako Inoue¹, Taiga Mizoguchi¹ (1. Ehime University)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[R3-02] The change in the hydrous mechanism of enstatite with Al incorporation

*Moe Sakurai¹, Hiroshi Sakuma², Noriyoshi Tsujino³, Eiichi Takahashi⁴, Katsuyuki Kawamura⁵ (1. Okayama Univ., 2. NIMS, 3. JASRI, 4. GIG, CAS, 5. Tokyo Tech.)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[R3-03] H and Al incorporation mechanisms in stishovite: New insights from multi-nuclear NMR and first-principles calculation

*Xianyu XUE¹, Masami Kanzaki¹ (1. Okayama University)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[R3-04] Influence of high oxygen fugacity on melting temperature of wadsleyite and chemical composition of the generated melts

[Presentation award entry]

*Kazutaka YAMAGUCHI¹, Takaaki Kawazoe¹, Toru Inoue¹, Takeshi Sakai² (1. Hiroshima Univ. Adv, 2. Ehime Univ. Geodynamics)

10:00 AM - 10:15 AM JST | 1:00 AM - 1:15 AM UTC

[R3-05] Anisotropic electrical resistivity in FeTiO₃ ilmenite, compressibility and spin state under high pressure.

*Takamitsu YAMANAKA¹ (1. Chinese HPSTAR)

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[R3-06] Melting relations at the mantle transition zone to uppermost lower mantle in the MgO-SiO₂-H₂O system

*Toru INOUE¹, Kota OKUMURA¹, Takaaki KAWAZOE¹, Sho KAKIZAWA², Masamichi NODA³, Tetsuo IRIFUNE⁴, Toru SHINMEI⁴ (1. Hiroshima Univ., 2. JASRI, 3. Delaware State Univ., 4. Ehime Univ. GRC)

10:30 AM - 10:45 AM JST | 1:30 AM - 1:45 AM UTC

[3Lecture-301-11-7add] 休憩

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[R3-07] **Water content profile of magma in the mantle transition zone predicted from high-pressure, high-temperature experiments**

[Presentation award entry]

*Yusuke Egi¹, Toru Inoue¹, Kota Okumura¹, Takaaki Kawazoe¹ (1. Hiroshima Univ. Sci.)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[R3-08] Elastic anomaly at the spin transition in ferropericlase: Revisited by GHz-DAC Ultrasonic Velocity Measurement newly developed

*Takuto Kato¹, Akira Yoneda¹, Tadashi Kondo¹, Daisuke Yamazaki² (1. Osaka Univ. Sci., 2. Okayama. IPM)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[R3-09] Iron-Water Exchange at the Earth's Core-Mantle Boundary

[Presentation award entry]

*Katsutoshi Kawano¹, Masayuki Nishi¹, Sho Kakizawa², Toru Inoue³, Hideharu Kuwahara⁴, Tadashi Kondo¹ (1. Osaka Univ. Sci, 2. JASRI, 3. Hiroshima Univ. Sci, 4. Ehime Univ. GRC)

Program

2023 Annual Meeting of Japan Association of Mineralogical Sciences (JAMS)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[R3-10] Increase of hydrogen-induced volume expansion by incorporation of Si into iron and the effect in estimated hydrogen content in the Earth's core

[Presentation award entry]

*Yuichiro MORI¹, Hiroyuki Kagi¹, Katsutoshi Aoki¹, Masahiro Takano¹, Sho Kakizawa², Asami Sano³, Ken-ichi Funakshi⁴ (1. UTokyo, 2. JASRI, 3. J-PARC Center, JAEA, 4. CROSS)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[R3-11] Post-spinel transition of Fe₂SiO₄ ahrensite at high pressure and high temperature

*Masaki AKAOGI^{1,2}, Natsuki MIYAZAKI¹, Taisuke TAJIMA¹, Hiroshi KOJITANI¹ (1. Gakushuin Univ. Sci., 2. Univ. Tokyo Sci.)

[zoom] Zoom

Oral presentation | R6: Plutonic rocks, volcanic rocks and subduction factory

10:15 AM - 12:00 PM JST | 1:15 AM - 3:00 AM UTC | 820 Sugimoto Campus

R6: Plutonic rocks, volcanic rocks and subduction factory

Chairperson: Takashi Yuguchi, Atsushi Kamei

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[R6-01] Igneous activity formed meta-granitoid in the Tenmondai rocks of the Lützow-Holm complex, East Antarctica

*Atsushi KAMEI¹, Momo Ichikawa¹, Tomokazu Hokada², Kenichiro Tani³, Ippei Kitano⁴, Sotaro Baba⁵, Nugroho I. Setiawan⁶, Prayath Nantasin⁷, Davaa-ochir Dashbaatar⁸, Yoichi Motoyoshi² (1. Shimane University, 2. National Institute of Polar Research, 3. National Museum of Nature and Science, 4. Hokkaido University, 5. University of the Ryukyus, 6. Universitas Gadjah Mada, 7. Kasetsart University, 8. Mongolian University of Science and Technology)

10:30 AM - 10:45 AM JST | 1:30 AM - 1:45 AM UTC

[R6-02] Mafic veins in the mantle section recovered during Oman Drilling Project: products of backarc spreading?

*Yuji ICHIYAMA¹, Hisatoshi Ito², Akihiro Tamura³, Tomoaki Morishita³ (1. Chiba University, 2. Central Research Institute of Electric Power Industry, 3. Kanazawa University)

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[R6-03] Muographic study of the oceanic crust-mantle density structure of the Oman Ophiolite

*Susumu UMINO¹, Hiroyuki Tanaka², László Oláh², Dezső Varga⁴, Tomoaki Morishita¹, Yoshihiro Hiramatsu¹, Yuki Kusano³ (1. Kanazawa University, 2. University of Tokyo, 3. AIST, 4. Wigner Research Center for Physics)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[R6-04] Magma genesis of the Iwafune diorites, Ibaraki Prefecture

[Presentation award entry]

*Haruki YAMAZAKI^{1,2}, Terumi EJIMA^{1,2}, Yoshiaki KON² (1. Shinshu Univ. Sci., 2. GSJ, AIST)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[R6-05] Zircon U-Pb age combined with trace element geochemistry constraining the source of Miocene granitoids of the Kagoshima Prefecture, Japan

*Hafiz Ur REHMAN¹, Marimo NAKABAYASHI¹, Yuki OTA¹, Kaushik DAS², Chung Sun LIN³, Hao YANG LEE³, Daisuke YAMASHITA⁴, Hiroshi YAMAMOTO¹ (1. Kagoshima Uni., 2. Hiroshima Uni., 3. IES, Academia Sinica, Taiwan, 4. Satsumasendai Kosh. Mus.)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[R6-06] Chronological re-examination of the Kanmon Group, Southwest Japan: and remaining unsolved problems

*Yukiyasu TSUTSUMI¹, Ryo Hasegawa², Yukio Isozaki³ (1. National Museum of Nature and Science, 2. FUJIFILM Business Innovation Corp., 3. Graduate school of Arts and Sciences, University of Tokyo)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[R6-07] U-Pb zircon age of granitoids in the Aoyama area, Ryoke belt, SW Japan

*Fumiko HIGASHINO¹, Tetsuo KAWAKAMI¹, Shuhei SAKATA², Shunpei Kudo¹, Yohei IGAMI¹ (1. Kyoto Univ. Sci., 2. Univ. Tokyo)

[zoom] Zoom

Oral presentation R5: Extraterrestrial materials
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2:00 PM - 3:00 PM JST | 5:00 AM - 6:00 AM UTC | 821 Sugimoto Campus

R5: Extraterrestrial materials

Chairperson: Megumi Matsumoto, Daiki Yamamoto, Yusuke Seto, Shogo Tahibana

2:00 PM - 2:15 PM JST | 5:00 AM - 5:15 AM UTC

[R5-12] Chemical Composition of Circumstellar Amorphous Silicate Dust: Condensation Experiments in the Na-Mg-Al-Si-Ca-Fe-Ni-O System

*Hanako Enomoto¹, Aki Takigawa¹ (1. UTokyo)

2:15 PM - 2:30 PM JST | 5:15 AM - 5:30 AM UTC

[R5-13] Survivability of presolar SiC grains in the protosolar disk: An experimental study

*Daiki YAMAMOTO¹, Aki TAKIGAWA², Shogo TACHIBANA² (1. Kyushu University, 2. University of Tokyo)

2:30 PM - 2:45 PM JST | 5:30 AM - 5:45 AM UTC

[R5-14] Antarctic micrometeorites containing pseudomorphs of melanophlogite: Dust from the sub-surface ocean of icy satellites or from an unknown type of trans-Neptunian objects?

*Takaaki NOGUCHI¹, Takuya Mitsunari^{2,3}, Rikako Matsumoto^{4,5}, Akira Yamaguchi⁶, Naoya Imae⁶, Toru Matsumoto¹, Toru Araki⁷, Hayato Yuzawa⁷, Akira Miyake¹ (1. Kyoto Univ. Sci., 2. Ibaraki Univ. Sci., 3. Mitsubishi Elect. Soft. Co., 4. Kyushu Univ. Sci., 5. Ine T.H., 6. NIPR, 7. IMS)

2:45 PM - 3:00 PM JST | 5:45 AM - 6:00 AM UTC

[R5-15] **Studies of Earth's minerals and rocky mixtures beyond Earth**

*Yasunori MIURA¹ (1. Post Yamaguchi Univ. Sci.)

[zoom] Zoom

Oral presentation R3: High-pressure science and deep Earth's material

2:00 PM - 3:00 PM JST | 5:00 AM - 6:00 AM UTC | 822 Sugimoto Campus

R3: High-pressure science and deep Earth's material

Chairperson: Takaaki Kawazoe (Hiroshima University), Takeshi Sakai (Ehime University), Masayuki Nishi (Osaka University)

2:00 PM - 2:15 PM JST | 5:00 AM - 5:15 AM UTC

[R3-12] High temperature formation of the oxygen-rich Martian core

*Eiji OHTANI¹, William F McDonough^{1,2} (1. Tohoku University, 2. University of Maryland)

2:15 PM - 2:30 PM JST | 5:15 AM - 5:30 AM UTC

[R3-13] Microtexture evolution of pure aluminum severely deformed at static high pressures

*Takuo OKUCHI^{1,2}, Yuto TANAKA^{2,1}, Naotaka TOMIOKA³, Tomokazu SANNO⁴, Tomoki MATSUDA⁴, Kazuto ARAKAWA⁵, Yusuke SETO⁶ (1. Kyoto Univ. KURNS, 2. Kyoto Univ. Mech. Eng., 3. Kochi JAMSTEC, 4. Osaka Univ. Eng., 5. Shimane Univ. NEXTA, 6. Osaka Metropolitan Univ. Sci.)

2:30 PM - 2:45 PM JST | 5:30 AM - 5:45 AM UTC

[R3-14] **Quantitative chemical analysis of the fine textures of natural and synthetic materials using ATEM**

*Kiyoshi FUJINO¹, Naotaka TOMIOKA², Hiroaki OHFUJI³ (1. Non, 2. JAMSTEC, 3. Tohoku Univ.)

2:45 PM - 3:00 PM JST | 5:45 AM - 6:00 AM UTC

[R3-15] Synthesis of polycrystalline diamond from glassy carbon by direct conversion at high pressure and temperature

Chinatsu Ogawa¹, *Tetsuo Irifune¹, Sayako Inoue¹, Takehiro Kunimoto¹, Toru Shinmei¹, Akimasa Suzumura², Shoichi Itoh² (1. Ehime University, 2. Kyoto University)

[zoom] Zoom

Oral presentation | S1: Dynamics of igneous processes (Special Session)

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S1: Dynamics of igneous processes (Special Session)

Chairperson: Morihisa Hamada(JAMSTEC), Shumpei Yoshimura(Hokkaido University)

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[S1-01] Dehydration and heating processes during magma transportation decoded from chemical zonings in peridotite xenolith from Ichinomegata, NE Japan

*Yuto SATO¹, Eiichi Takahashi¹, Kazuhito Ozawa² (1. GIGCAS, 2. AORI, Univ. Tokyo)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[S1-02] **Post-entrapment density modification of fluid inclusions by elastic deformation: Implications for fluid inclusion geobarometry of peridotites**

*Yuuki HAGIWARA¹, Ross John Angel², Junji Yamamoto³, Rosario Esposito⁴, Matteo Alvaro⁵ (1. JAMSTEC, 2. IGG-CNR, 3. Kyushu University, 4. University of Milano-Bicocca, 5. University of Pavia)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[S1-03] Textural and chemical changes of alkali feldspar during disequilibrium melting of granite

*Hiroshi KAWABATA¹, Shigeru YAMASHITA² (1. Kochi University, 2. Okayama University)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[S1-04] Experimental simulation of crystallite and spherulite in rhyolitic lava

*Tamotsu Sugawara¹, Shumpei Yoshimura¹ (1. Hokkaido Univ. Sci.)

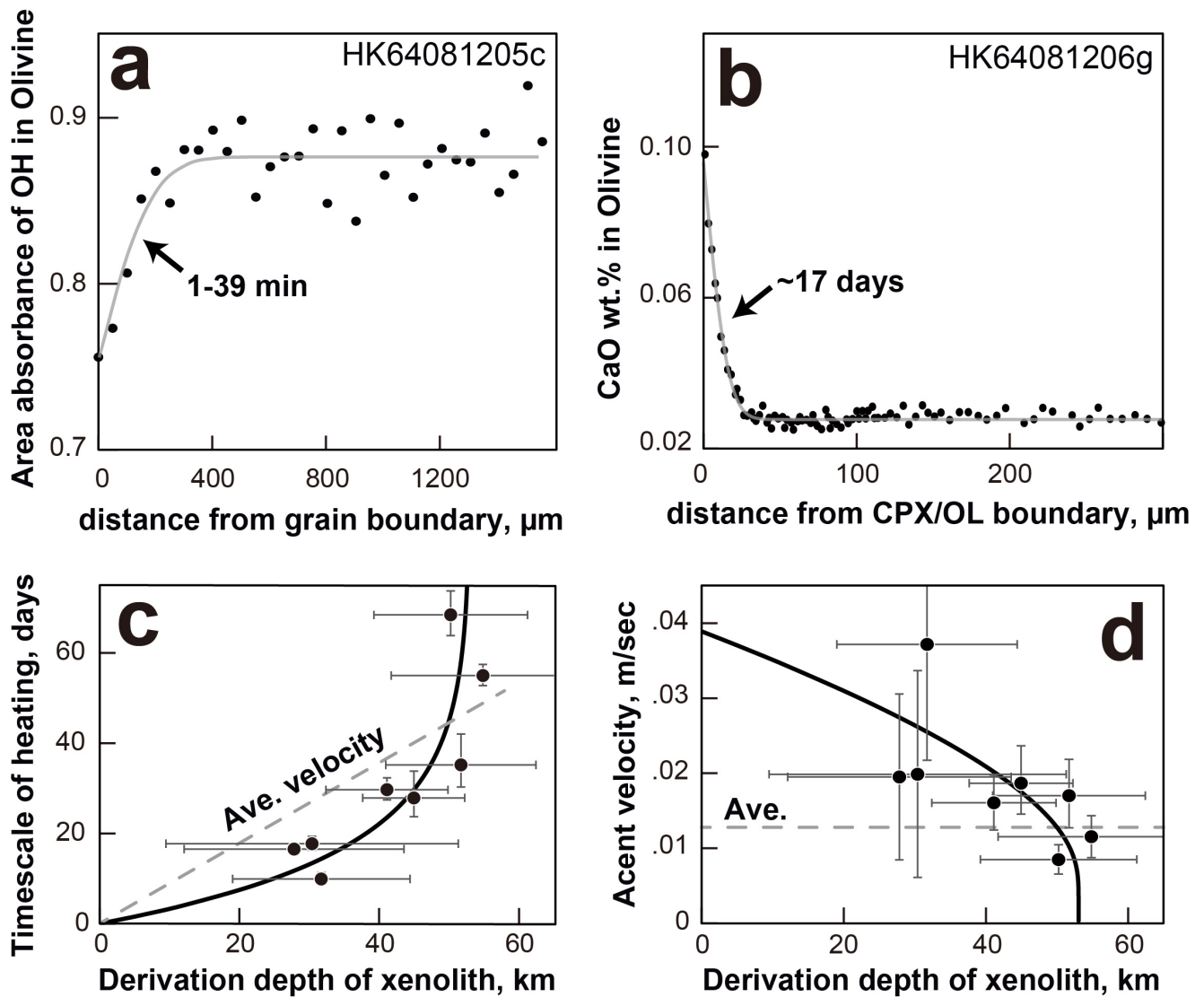
[zoom] Zoom

Dehydration and heating processes during magma transportation decoded from chemical zonings in peridotite xenolith from Ichinomegata, NE Japan

*Yuto SATO¹, Eiichi Takahashi¹, Kazuhito Ozawa²

1. GIGCAS, 2. AORI, Univ. Tokyo

Keywords: mantle xenolith, magma transportation, chemical zoning, water content, olivine



Post-entrapment density modification of fluid inclusions by elastic deformation: Implications for fluid inclusion geobarometry of peridotites

*Yuuki HAGIWARA¹, Ross John Angel², Junji Yamamoto³, Rosario Esposito⁴, Matteo Alvaro⁵

1. JAMSTEC, 2. IGG-CNR, 3. Kyushu University, 4. University of Milano-Bicocca, 5. University of Pavia

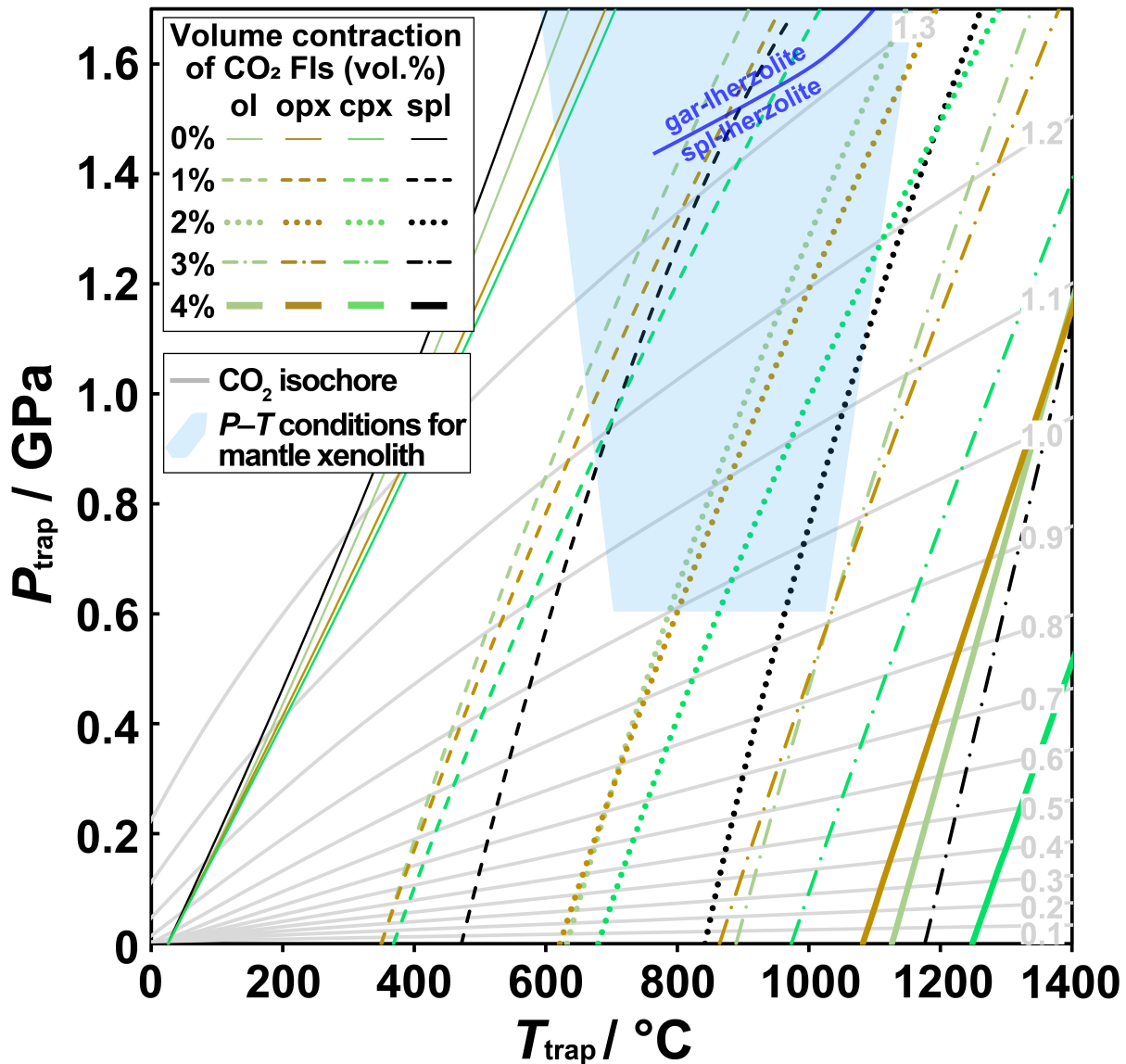
Changes in fluid inclusion (FI) density (ρ_{inc}) due to elastic deformation of the host mineral have long been recognized as a possible source of systematic error in the estimation of trapping pressures by FI geobarometry (e.g., Ermakov 1950), but it has been difficult to accurately assess the effect of elastic deformation on ρ_{inc} . However, recent improvements in elastic geobarometry theory (e.g., Angel et al. 2014; 2017) and equations of state of host minerals (e.g., Angel et al. 2018; Hagiwara et al. 2022) have allowed us to accurately assess the uncertainty that elastic deformation brings to FI geobarometry. Here, we evaluate the influence of elastic deformation on the estimation of the depth provenance by FI geobarometry, using peridotites as examples, and propose a correction method.

We show that, due to elastic deformation, the measured ρ_{inc} of FI trapped under typical P - T conditions of spinel-lherzolites are about 0–3% greater than the density at the P - T conditions of entrapment. Therefore, unless the effects of elastic deformation are corrected, trapping pressures will be slightly overestimated. Our results also demonstrate that differences in the elastic properties of the host minerals do not play any role in the widely reported mineral species dependence of measured ρ_{inc} (i.e., spinel > opx ~ cpx > olivine) in peridotites. Furthermore, it was also demonstrated that fluid density change by laser heating (Hagiwara et al. 2021a; 2021b) and cation ordering of spinel (Hagiwara et al. 2022) cannot explain this mineral species dependence. These results mean that ρ_{inc} of FIs in olivine, orthopyroxene, and clinopyroxene are reduced by factors other than elastic deformation because it is unlikely that any mechanism other than elastic deformation or cation ordering can increase the ρ_{inc} . Therefore, P_{trap} estimated using the FIs in spinel should be closer to the true entrapment pressures than those obtained from FIs in olivine, orthopyroxene, and clinopyroxene.

References

Angel et al. (2014) *Am Mineral*, **99**, 2146-2149; Angel et al. (2017) *Am Mineral*, **102**, 1957-1960; Angel et al. (2018) *Phys Chem Miner*, **45**, 95-113; Ermakov (1950) University of Kharkov Press, 460 pp.; Hagiwara et al. (2021a) *J. Raman Spectros.* **52**, 1744–1757; Hagiwara et al. (2021b) *Chem. Geol.* **559**, 119928; Hagiwara et al. (2022) *Contrib. Min. Petrol.* **177**

Keywords: Fluid inclusion, Geobarometry, Equation of state, Elastic deformation, Raman spectroscopy



トラップ条件(P_{trap} と T_{trap})から標準状態(0 GPaと25°C)まで P - T が低下する過程で olivine, opx, cpx, spinel中のCO₂流体包有物の体積が0, 1, 2, 3, 4%減少する等積変化線。青い領域はマントル捕獲岩の典型的な由来 P - T 領域である(Hasterok & Chapman 2011)。灰色の曲線はCO₂の等密度線である(Pitzer and Sterner 1994)。

Textural and chemical changes of alkali feldspar during disequilibrium melting of granite

*Hiroshi KAWABATA¹, Shigeru YAMASHITA²

1. Kochi University, 2. Okayama University

Keywords: Alkali feldspar, Disequilibrium melting

Experimental simulation of crystallite and spherulite in rhyolitic lava

*Tamotsu Sugawara¹, Shumpei Yoshimura¹

1. Hokkaido Univ. Sci.

Keywords: Crystallization, Rhyolite, Spherulite, Crystallite

Oral presentation

S1: Dynamics of igneous processes (Special Session)

Chairperson: Morihisa Hamada(JAMSTEC), Shumpei Yoshimura(Hokkaido University)

Sat. Sep 16, 2023 9:00 AM - 10:00 AM 820 (Sugimoto Campus)

[zoom]Zoom

Zoom

Oral presentation | R5: Extraterrestrial materials

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R5: Extraterrestrial materials

Chairperson: Megumi Matsumoto, Daiki Yamamoto, Yusuke Seto, Shogo Tahibana

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[R5-01] Shock deformation microstructures in rutile

*Yuhei Umeda¹, Yuma Nagai¹, Naotaka Tomioka², Toshimori Sekine³, Masashi Miyakawa⁴, Takamichi Kobayashi⁴, Hitoshi Yusa⁴, Takuo Okuchi¹ (1. Kyoto Univ. KURNS., 2. JAMSTEC, 3. HPSTAR, 4. NIMS)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[R5-02] Microstructures of calcite deformed by 3-D shock experiments

*Naotaka TOMIOKA¹, Kosuke Kurosawa², Haruka Ono³, Takafumi Niihara⁴, Takafumi Matsui² (1. KOCHI, JAMSTEC, 2. PERC, Chiba Inst. Tech., 3. Res. Org. Sci. Tech., Ritsumeikan Univ., 4. Dept App. Sci., Okayama Sci. Univ.)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[R5-03] FIB-TEM observation of silica minerals coexisting in achondrites

*Atsushi TAKENOUCHI¹, Youhei Igami², Akira Miyake², Haruka Ono³, Takashi Mikouchi⁴, Akira Yamaguchi⁵ (1. The Kyoto Univ. Museum, 2. Kyoto Univ., 3. Ritsumeikan Univ., 4. The Univ. Museum, The Univ. of Tokyo, 5. Natl. Inst. of Polar Res.)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[R5-04] Assessment of Shock Melting of Martian Meteorites as Deduced from Short Time Heating Experiments of Basalt and Martian Soil Simulants

[\[Presentation award entry\]](#)

*Takeru Sato¹, Takashi Mikouchi² (1. Univ. of Tokyo, 2. Univ. of Tokyo)

10:00 AM - 10:15 AM JST | 1:00 AM - 1:15 AM UTC

[R5-05] Observation of internal structure of diamond in carbon grains in DaG 999 ureilite.

*Masahiro YASUTAKE¹, Megumi Matsumoto³, Junya Matsuno², Akira Tsuchiyama^{2,4}, Kentaro Uesugi¹, Akihisa Takeuchi¹ (1. JASRI, 2. Ritsumeikan Univ., 3. Tohoku Univ., 4. CAS/GIG)

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[3Lecture-201-11-6add] 休憩

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[R5-07] Nano-CT and TEM analysis of impact melt splashes and microcraters on asteroid Ryugu samples

*Megumi MATSUMOTO¹, Junya Matsuno², Akira Tsuchiyama^{2,3}, Tomoki Nakamura¹, Yuma Enokido¹, Mizuha Kikuri¹, Masahiro Yasutake⁴, Kentaro Uesugi⁴, Akihisa Takeuchi⁴, Satomi Enju⁵, Shota Okumura⁶, Itaru Mitsukawa⁶, Sun Mingqi³, Akira Miyake⁶, Hayabusa2 initial analysis core-team (1. Tohoku Univ., 2. Ritsumeikan Univ., 3. GIG, CAS, 4. JASRI, 5. Ehime Univ., 6. Kyoto Univ.)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[R5-08] Origins of olivine grains in CI chondrites and asteroid Ryugu samples as inferred from their major and minor element compositions

*Takashi MIKOUCHI¹, Hideto Yoshida¹, Minami Masuda¹, Michael E. Zolensky² (1. Univ. of Tokyo, 2. NASA/JSC)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[R5-09] On the relationship between modal abundances of minerals and degrees of aqueous alteration of the brecciated fragments in the Orgueil CI chondrite

*Minami Masuda¹, Takashi Mikouchi², Michael Zolensky³ (1. UTokyo Sci., 2. UTokyo UMUT/Sci., 3. NASA JSC)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[R5-10] Mineralogical diversity of the C1 lithologies in the Kaidun meteorite

[Presentation award entry]

*Kenei OGIYA¹, Takashi Mikouchi², Michael E Zolensky³ (1. Univ. of Tokyo, 2. Univ. of Tokyo, 3. NASA)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[R5-11] Classification of subtype 3.0 chondrites

*Makoto Kimura¹, Michale K. Weisberg², Akira Yamaguchi¹ (1. National Institute of Polar Rsearch, 2. City University of New York)

[zoom] Zoom

Shock deformation microstructures in rutile

*Yuhei Umeda¹, Yuma Nagai¹, Naotaka Tomioka², Toshimori Sekine³, Masashi Miyakawa⁴, Takamichi Kobayashi⁴, Hitoshi Yusa⁴, Takuo Okuchi¹

1. Kyoto Univ. KURNS., 2. JAMSTEC, 3. HPSTAR, 4. NIMS

Shock response of minerals is an essential clue for understanding of deformation properties of rocks during natural impact events in the history of Earth and planets. Shock-compression experiments are the primary method for simulating such deformation process. Shock recovery experiments using a single-stage propellant were conducted for single crystal and powdered rutile to investigate the effect of heating related to porosity on the shock-induced deformation microstructures. X-ray diffraction (XRD) and transmission electron microscopy (TEM) analyses of the shocked single crystal rutile revealed that a high-density of stacking fault occurred on the (101) plane. The defect suggests that the dominant slip system in the plastic deformation of the crystal is $\{101\}\langle 01 \rangle$. A part of the crystal is intergrown with the α -PbO₂ structure in a topotaxial relationship: $[010]_{\text{Rt}} // [001]_{\alpha\text{-PbO}_2}$. Based on topological analysis, the single crystal rutile would have transformed to the α -PbO₂ structure via the calcium-fluoride structure concomitantly with shear deformation. Meanwhile, the shocked powdered rutile consists mainly of particles with pervasive entangled dislocations and recrystallized particles, where the α -PbO₂ structure did not occur at all. Considering the absence of stacking faults, a possible dominant slip system in the shocked powdered rutile is $\{110\}[001]$.

Keywords: Rutile, Shock recovery experiment, Deformation, Defect

Microstructures of calcite deformed by 3-D shock experiments

*Naotaka TOMIOKA¹, Kosuke Kurosawa², Haruka Ono³, Takafumi Niihara⁴, Takafumi Matsui²

1. KOCHI, JAMSTEC, 2. PERC, Chiba Inst. Tech., 3. Res. Org. Sci. Tech., Ritsumeikan Univ., 4. Dept App. Sci., Okayama Sci. Univ.

Keywords: Calcite, Shock experiments, Dislocations, Transmission electron microscopy

FIB-TEM observation of silica minerals coexisting in achondrites

*Atsushi TAKENOUCHI¹, Youhei Igami², Akira Miyake², Haruka Ono³, Takashi Mikouchi⁴, Akira Yamaguchi⁵

1. The Kyoto Univ. Museum, 2. Kyoto Univ., 3. Ritsumeikan Univ., 4. The Univ. Museum, The Univ. of Tokyo, 5. Natl. Inst. of Polar Res.

Keywords: silica, achondrites, phase transition, thermal history, tridymite

Assessment of Shock Melting of Martian Meteorites as Deduced from Short Time Heating Experiments of Basalt and Martian Soil Simulants

*Takeru Sato¹, Takashi Mikouchi²

1. Univ. of Tokyo, 2. Univ. of Tokyo

Keywords: Martian Meteorite, Shergottite, Heating Experiment, Regolith, Maskelynite

表 1 JSC Mars-1 を用いた加熱実験の結果

	10秒	30秒	1分	5分	10分	60分
1300度	△	○	○	-	-	◎
1200度	△	△	○	-	-	◎
1150度	△	△	△	○	○	○
1125度	△	△	△	-	-	○
1100度	-	-	-	-	-	△

◎：ほとんど(~90%)が溶融、○：少量(~10%)が溶融、△：わずかに(~5%)溶融

Observation of internal structure of diamond in carbon grains in DaG 999 ureilite.

*Masahiro YASUTAKE¹, Megumi Matsumoto³, Junya Matsuno², Akira Tsuchiyama^{2,4}, Kentaro Uesugi¹, Akihisa Takeuchi¹

1. JASRI, 2. Ritsumeikan Univ., 3. Tohoku Univ., 4. CAS/GIG

Keywords: SR-CT, meteorite, ureilite, diamond, graphite

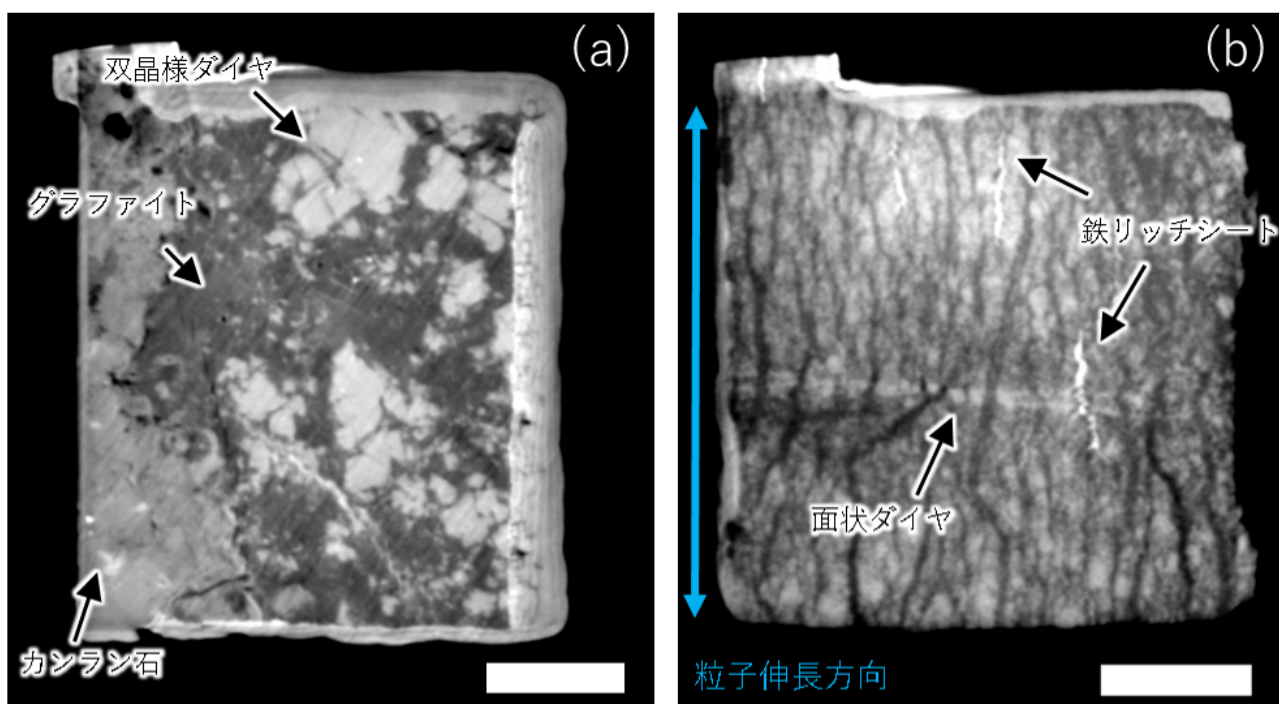


図1. 炭素粒子のCT断面像。(a) 粒子2の位相像。グラファイト中にマイクロダイヤモンドが囲まれるように産する。図上部には双晶様に産するダイヤモンドが見られる。(b) 粒子3の位相像。試料全体に粒子伸長方向（紙面上下）と平行な層構造が発達している。また、特徴的に鉄に富むシートが含まれる。図中央には層構造とほぼ直行方向（紙面左右）に面状のダイヤモンドと思われるものが分布する。この構造上下方向の層構造に切られている事が分かる。図中スケールバーは10 μ m。

Oral presentation

R5: Extraterrestrial materials

Chairperson: Megumi Matsumoto, Daiki Yamamoto, Yusuke Seto, Shogo Tahibana

Sat. Sep 16, 2023 9:00 AM - 12:00 PM 821 (Sugimoto Campus)

10:15 AM - 10:30 AM

[3Lecture-201-11-6add]休憩

Nano-CT and TEM analysis of impact melt splashes and microcraters on asteroid Ryugu samples

*Megumi MATSUMOTO¹, Junya Matsuno², Akira Tsuchiyama^{2,3}, Tomoki Nakamura¹, Yuma Enokido¹, Mizuha Kikuri¹, Masahiro Yasutake⁴, Kentaro Uesugi⁴, Akihisa Takeuchi⁴, Satomi Enju⁵, Shota Okumura⁶, Itaru Mitsukawa⁶, Sun Mingqi³, Akira Miyake⁶, Hayabusa2 initial analysis core-team

1. Tohoku Univ., 2. Ritsumeikan Univ., 3. GIG, CAS, 4. JASRI, 5. Ehime Univ., 6. Kyoto Univ.

Keywords: asteroid (162173) Ryugu, micrometeoroid impact, impact melt splash

Origins of olivine grains in CI chondrites and asteroid Ryugu samples as inferred from their major and minor element compositions

*Takashi MIKOUCHI¹, Hideto Yoshida¹, Minami Masuda¹, Michael E. Zolensky²

1. Univ. of Tokyo, 2. NASA/JSC

Keywords: CI chondrite, Asteroid Ryugu, Olivine, Amoeboid olivine aggregat (AOA), Chondrule

On the relationship between modal abundances of minerals and degrees of aqueous alteration of the brecciated fragments in the Orgueil CI chondrite

*Minami Masuda¹, Takashi Mikouchi², Michael Zolensky³

1. UTokyo Sci., 2. UTokyo UMUT/Sci., 3. NASA JSC

Keywords: CI chondrite, Orgueil meteorite, modal abundance

	Org小_1_01	Org小_1_02	Org小_1_03	Org小_1_04	Org小_2_01	Org小_2_02	Org小_2_03	Org小_2_04	Org小_2_05	Org小_2_06
層状ケイ酸塩	96.32	95.43	93.82	93.90	94.10	95.53	94.44	99.11	96.50	92.62
マグネサイト	1.56	3.73	3.66	2.78	2.43	3.96	2.85	0.89	2.30	6.61
硫化鉄	1.69	0.07	0.14	0.13	0.15	0.26	0.05	—	—	0.12
ドロマイト	0.33	0.54	1.79	3.19	1.66	0.21	2.53	—	0.89	0.64
ブリューネライト	—	—	—	—	—	—	—	—	—	—
Ca炭酸塩	—	—	—	—	—	—	—	—	—	—
Caリン酸塩	0.10	0.21	0.59	0.00	1.66	0.04	0.14	—	0.31	0.01
カンラン石、輝石	—	0.03	—	—	—	—	—	—	—	—

	Org小_2_07	Org小_2_08	Org小_2_09	Org小_3_01	Org小_3_02	Org小_3_03	Org小_3_04	Org小_3_05	Org小_3_06	Org小_3_07	Org小_3_08
	93.29	98.08	95.50	95.87	99.10	96.63	96.66	97.10	96.70	96.65	98.45
	2.83	1.85	2.68	3.15	0.83	1.82	2.67	2.05	3.11	1.40	1.10
	0.02	—	1.06	0.01	—	0.02	0.00	0.01	—	—	—
	3.72	0.07	0.72	0.92	—	1.15	0.41	0.44	0.14	0.43	0.41
	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—
	0.13	—	0.04	0.04	—	0.39	0.26	0.40	0.05	—	—
	—	—	—	0.01	0.07	—	—	—	—	1.52	0.04

	Org大_00	Org大_01	Org大_04	Org大_17	Org大_18	Org大_21	Org大_26	Org大_30	Org大_31	Org大_33	Org大_35	Org大_36
	92.96	95.37	91.43	94.44	90.34	90.06	94.93	96.16	93.12	92.56	92.79	92.74
	6.76	4.63	7.49	5.02	7.82	9.04	4.48	3.44	6.26	6.46	6.56	6.69
	0.04	—	—	—	—	0.05	0.59	0.45	0.46	—	0.33	0.31
	0.28	—	1.08	0.55	1.84	0.90	0.59	0.40	0.62	0.98	0.66	0.58
	—	—	—	—	—	—	—	—	—	—	—	—
	0.05	—	—	—	—	—	—	—	—	0.06	—	—
	—	—	—	—	—	—	—	0.04	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—

表 1

Mineralogical diversity of the C1 lithologies in the Kaidun meteorite

*Kenei OGIYA¹, Takashi Mikouchi², Michael E Zolensky³

1. Univ. of Tokyo, 2. Univ. of Tokyo, 3. NASA

Keywords: Carbonaceous chondrite, Aqueous alteration, Petrological type 1, Carbonate minerals, Iron sulfides

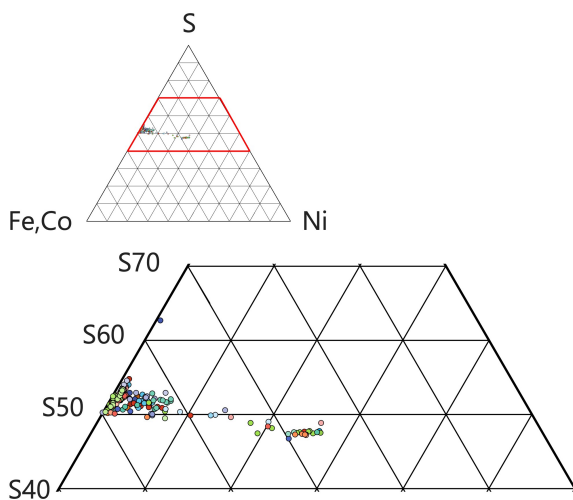


図1
38個のKaidun C1岩片における鉄硫化物組成

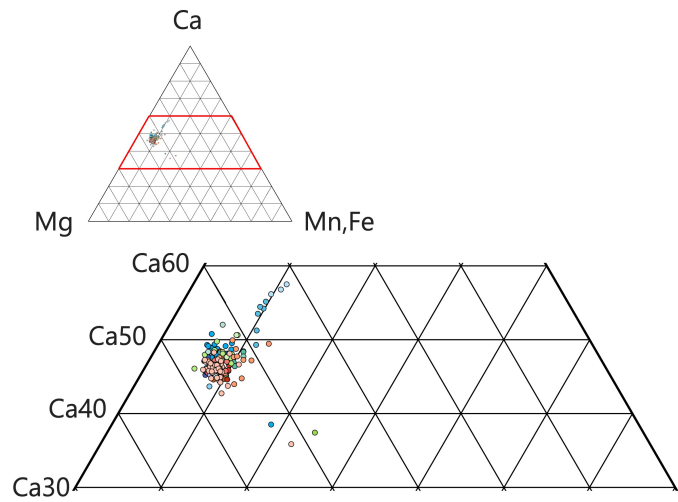


図2
21個のKaidun C1岩片におけるdolomite組成

Classification of subtype 3.0 chondrites

*Makoto Kimura¹, Michale K. Weisberg², Akira Yamaguchi¹

1. National Institute of Polar Rsearch, 2. City University of New York

Type 3 chondrites are subdivided into 3.0 to 3.9. Subtype 3.0 chondrites nearly preserve all of their primitive features. Many criteria have been proposed to distinguish such primitive chondrites. Here we compiled mineral data and reconsider the classification criteria for subtype 3.0.

Keywords: Chondrite, Classification

Oral presentation

R5: Extraterrestrial materials

Chairperson: Megumi Matsumoto, Daiki Yamamoto, Yusuke Seto, Shogo Tahibana

Sat. Sep 16, 2023 9:00 AM - 12:00 PM 821 (Sugimoto Campus)

[zoom]Zoom

Zoom

Oral presentation | R3: High-pressure science and deep Earth's material

📅 Sat. Sep 16, 2023 9:00 AM - 12:00 PM JST | Sat. Sep 16, 2023 12:00 AM - 3:00 AM UTC | 🏠 822 Sugimoto Campus

R3: High-pressure science and deep Earth's material

Chairperson: Takaaki Kawazoe (Hiroshima University), Takeshi Sakai (Ehime University), Masayuki Nishi (Osaka University)

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[R3-01] First-principles investigations of the polysomatism of antigorite under pressure

*Jun TSUCHIYA¹, Sayako Inoue¹, Taiga Mizoguchi¹ (1. Ehime University)

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[R3-02] The change in the hydrous mechanism of enstatite with Al incorporation

*Moe Sakurai¹, Hiroshi Sakuma², Noriyoshi Tsujino³, Eiichi Takahashi⁴, Katsuyuki Kawamura⁵ (1. Okayama Univ., 2. NIMS, 3. JASRI, 4. GIG, CAS, 5. Tokyo Tech.)

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[R3-03] H and Al incorporation mechanisms in stishovite: New insights from multi-nuclear NMR and first-principles calculation

*Xianyu XUE¹, Masami Kanzaki¹ (1. Okayama University)

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[R3-04] Influence of high oxygen fugacity on melting temperature of wadsleyite and chemical composition of the generated melts

[Presentation award entry]

*Kazutaka YAMAGUCHI¹, Takaaki Kawazoe¹, Toru Inoue¹, Takeshi Sakai² (1. Hiroshima Univ. Adv, 2. Ehime Univ. Geodynamics)

10:00 AM - 10:15 AM JST | 1:00 AM - 1:15 AM UTC

[R3-05] Anisotropic electrical resistivity in FeTiO₃ ilmenite, compressibility and spin state under high pressure.

*Takamitsu YAMANAKA¹ (1. Chinese HPSTAR)

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[R3-06] Melting relations at the mantle transition zone to uppermost lower mantle in the MgO-SiO₂-H₂O system

*Toru INOUE¹, Kota OKUMURA¹, Takaaki KAWAZOE¹, Sho KAKIZAWA², Masamichi NODA³, Tetsuo IRIFUNE⁴, Toru SHINMEI⁴ (1. Hiroshima Univ.y, 2. JASRI, 3. Delaware State Univ., 4. Ehime Univ. GRC)

10:30 AM - 10:45 AM JST | 1:30 AM - 1:45 AM UTC

[3Lecture-301-11-7add] 休憩

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[R3-07] **Water content profile of magma in the mantle transition zone predicted from high-pressure, high-temperature experiments**

[Presentation award entry]

*Yusuke Egi¹, Toru Inoue¹, Kota Okumura¹, Takaaki Kawazoe¹ (1. Hiroshima Univ. Sci.)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[R3-08] Elastic anomaly at the spin transition in ferroperricite: Revisited by GHz-DAC Ultrasonic Velocity Measurement newly developed

*Takuto Kato¹, Akira Yoneda¹, Tadashi Kondo¹, Daisuke Yamazaki² (1. Osaka Univ. Sci., 2. Okayama. IPM)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[R3-09] Iron-Water Exchange at the Earth's Core-Mantle Boundary

[Presentation award entry]

*Katsutoshi Kawano¹, Masayuki Nishi¹, Sho Kakizawa², Toru Inoue³, Hideharu Kuwahara⁴, Tadashi Kondo¹ (1. Osaka Univ. Sci, 2. JASRI, 3. Hiroshima Univ. Sci, 4. Ehime Univ. GRC)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[R3-10] Increase of hydrogen-induced volume expansion by incorporation of Si into iron and the effect in estimated hydrogen content in the Earth's core

[Presentation award entry]

*Yuichiro MORI¹, Hiroyuki Kagi¹, Katsutoshi Aoki¹, Masahiro Takano¹, Sho Kakizawa², Asami Sano³, Ken-ichi Funakshi⁴ (1. UTokyo, 2. JASRI, 3. J-PARC Center, JAEA, 4. CROSS)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[R3-11] Post-spinel transition of Fe₂SiO₄ ahrensite at high pressure and high temperature

*Masaki AKAOGI^{1,2}, Natsuki MIYAZAKI¹, Taisuke TAJIMA¹, Hiroshi KOJITANI¹ (1. Gakushuin Univ. Sci. , 2. Univ. Tokyo Sci.)

[zoom] Zoom

First-principles investigations of the polysomatism of antigorite under pressure

*Jun TSUCHIYA¹, Sayako Inoue¹, Taiga Mizoguchi¹

1. Ehime University

Serpentine is hydrous phyllosilicate known to be formed in the mantle wedge by a reaction between mantle peridotite and upwelling water released by the decomposition of hydrous minerals in the subducting slab [e.g. Schmidt and Poli, 1998]. Partially serpentinized peridotite may be a significant reservoir of water in the mantle wedge and the dehydration of serpentine is considered to have an important contribution to the generation of arc magmatism. This was also extensively investigated in connection with intermediate and deep earthquakes [e.g. Irifune et al., 1996].

In order to investigate the transporting processes of water into the Earth's interior, the thermodynamic stabilities and the elastic properties of antigorite should be clarified. Antigorite is the high-temperature polymorph of serpentine and thus the relevant phase in the subduction zone. This phase has been reported to show polysomatism depending on the pressure and temperature conditions. Previous TEM study reported that m value (m = number of SiO_4 tetrahedra in a wavelength along the a axis) increases/decreases with pressure/temperature [e.g. Wunder et al. 2001]. However, there is no sufficient structural and thermodynamic corroboration regarding the stable polysome of antigorite along the pressure and temperature conditions of the subducting oceanic plate.

In the present study, we investigated the structure and elasticity of antigorite with several different m values by ab initio calculation and discuss the stable polysome of antigorite in the subducting oceanic plate.

Keywords: ab initio calculation, antigorite

The change in the hydrous mechanism of enstatite with Al incorporation

*Moe Sakurai¹, Hiroshi Sakuma², Noriyoshi Tsujino³, Eiichi Takahashi⁴, Katsuyuki Kawamura⁵

1. Okayama Univ., 2. NIMS, 3. JASRI, 4. GIG, CAS, 5. Tokyo Tech.

Keywords: Hydrous mechanism, DFT calculation, FT-IR

H and Al incorporation mechanisms in stishovite: New insights from multi-nuclear NMR and first-principles calculation

*Xianyu XUE¹, Masami Kanzaki¹

1. Okayama University

Aluminous stishovite has been recognized as an important water carrier in subducted oceanic basalts, and may be responsible for some observed seismic anomalies. In order to constrain how the incorporation of H and Al in stishovite affects its physical properties, it is important to understand how these elements are incorporated in the crystal structure. Previous studies generally reported that the H/Al ratios in stishovite are significantly below unity, requiring both coupled Al+H substitution for Si and excess Al accompanied by oxygen vacancies. However, there have been little direct supporting evidences for the proposed substitution mechanisms. In this study, we performed a comprehensive ¹H MAS and static NMR, ²⁷Al MAS and 3QMAS NMR, ¹H-²⁹Si and ¹H-²⁷Si CPMAS NMR study on a hydrous aluminous stishovite sample, which was first described in Xue et al. (2006) *Am Mineral* 91, 850-861, and synthesized from a nominal bulk composition of 0.95SiO₂.0.05AlOOH at 18 GPa and 1800°C. NMR measurements were made using a Bruker Avance NEO 400 spectrometer. We also performed first-principles calculation with the GIPAW method using the Quantum-ESPRESSO package (v.7.0) on various optimized model structures containing coupled Al+H substitution for Si and substitution of 2Al+1O vacancy for 2Si to help interpretation. It was found that the sample consists of a hydrous aluminous stishovite phase containing about 0.3 wt% H₂O, coexisting with Al₂O₃ corundum. The stishovite phase yields a ¹H MAS NMR peak near 9.4 ppm, a ¹H-²⁹Si CPMAS NMR peak near -191 ppm with a weak shoulder toward less negative chemical shift, attributable to octahedral Si, and a ¹H-²⁷Al CPMAS NMR peak with a maximum near 1.9 ppm, attributable to octahedral Al. The main features of all the observed NMR spectra are consistent with first-principles calculation results for coupled Al-H substitution for Si. No four- or five- coordinated Si or Al, which should occur if the substitution mechanism of 2Al+O vacancy for 2Si operates, were revealed, although expected to be observable (e.g., calculated C_Q^{Al} around 6.0~9.4 MHz for Al^V). This study thus casted doubt on the general validity of views held thus far about H and Al incorporation mechanisms in stishovite. Raman and EPMA analyses are also under planning, and the latest results will be presented at the meeting.

Keywords: water, stishovite, NMR, first-principles calculation, aluminum

Influence of high oxygen fugacity on melting temperature of wadsleyite and chemical composition of the generated melts

*Kazutaka YAMAGUCHI¹, Takaaki Kawazoe¹, Toru Inoue¹, Takeshi Sakai²

1. Hiroshima Univ. Adv, 2. Ehime Univ. Geodynamics

Keywords: Wadsleyite, Ferric iron, Oxygen fugacity, Melting temperature, Mantle transition zone

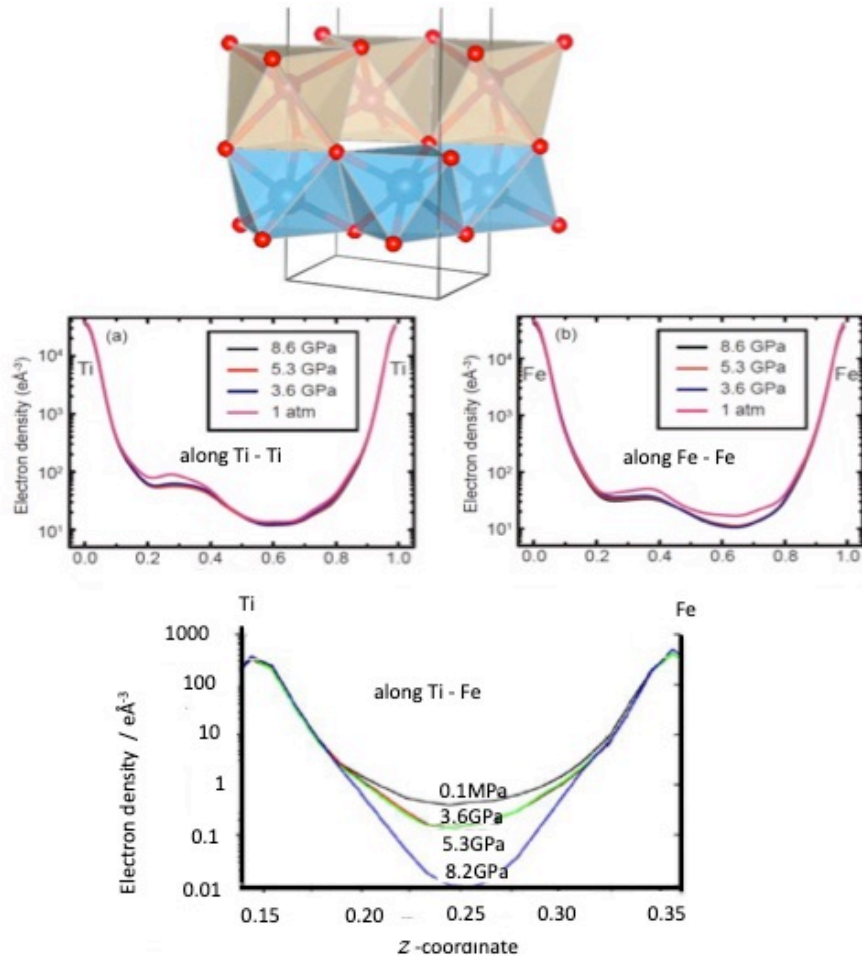
Anisotropic electrical resistivity in FeTiO₃ ilmenite, compressibility and spin state under high pressure.

*Takamitsu YAMANAKA¹

1. Chinese HPSTAR

Neutron and synchrotron X-ray diffraction experiments perform precise analysis of the FeTiO₃ ilmenite structure. FeTiO₃ does neither transform into perovskite nor LiNbO₃ structure phase under pressures up to 28 GPa. However, different compression curves of both FeO₆ and TiO₆ octahedra are observed below 8 GPa. FeO₆ is more compressive and flexible than TiO₆. TiO₆ octahedron is an extremely rigid body. Pressure dependence of electrical resistivity using single crystal proves that FeTiO₃ ilmenite shows an anisotropic electrical conductivity. The resistivity in the direction perpendicular to the *c*-axis decreases monotonously with increasing pressure. On the other hand the resistivity parallel to the *c*-axis shows the hallow-shape of the curvature. In three Fe-Fe, Ti-Ti and Fe-Ti atomic distances, the shortest Fe-Ti distance presents the highest electrical conduction and electron mobility of Fe²⁺Ti⁴⁺ and Fe³⁺Ti³⁺ by electron super exchange during compression between adjacent Fe and Ti cations. The electron localization around Fe and Ti atoms is clarified by maximum entropy measurement calculation. Electron configuration of Fe²⁺ (*3d*⁶) is more strongly changed than Ti⁴⁺ (*3d*⁰) under compression. The electron configuration of the former cation is related to the revolution of Jahn-Teller effect in the ligand field of C_{3v} molecular symmetry. The anisotropic electrical conductivity and non-uniform structure change of Fe-Ti interatomic distance can be explained by the possible spin transition. The spin transition of Fe from high-spin state to intermediate-spin state is possible in the electronic state change of FeTiO₃.

Keywords: FeTiO₃ ilmenite, high-pressure neutron diffraction, electrical resistivity measurement, anisotropic electron super exchange, electron radial distribution



Melting relations at the mantle transition zone to uppermost lower mantle in the MgO-SiO₂-H₂O system

*Toru INOUE¹, Kota OKUMURA¹, Takaaki KAWAZOE¹, Sho KAKIZAWA², Masamichi NODA³, Tetsuo IRIFUNE⁴, Toru SHINMEI⁴

1. Hiroshima Univ.y, 2. JASRI, 3. Delaware State Univ., 4. Ehime Univ. GRC

Keywords: MgO-SiO₂-H₂O system, Melting relations, mantle transition zone, lower mantle, hydrous magma

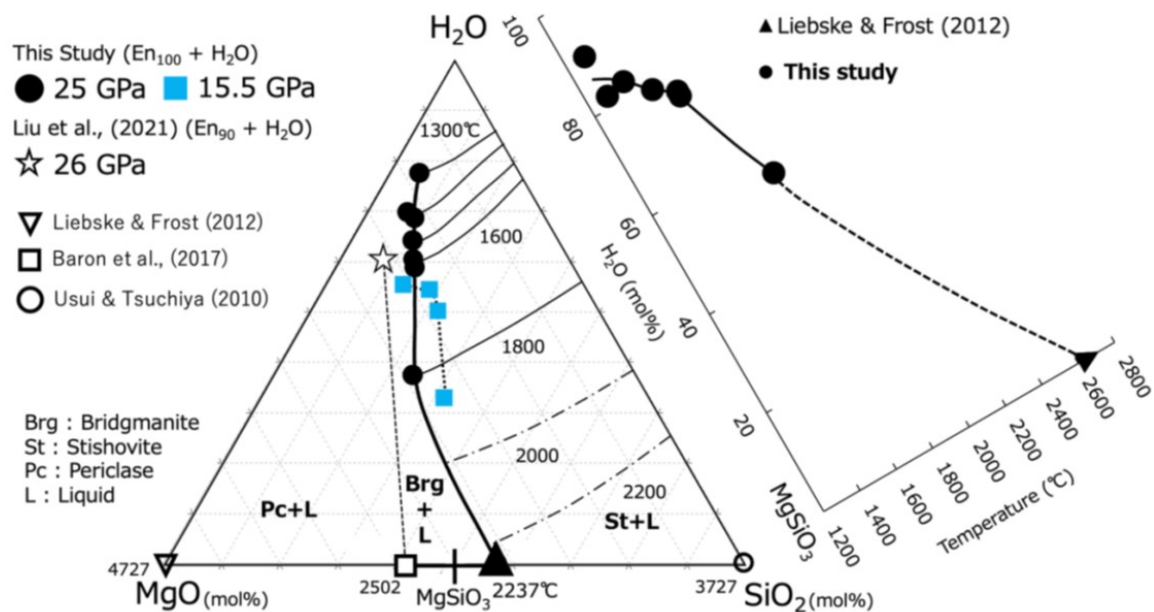


図 1. MgO-SiO₂-H₂O 系における共融線 (15.5 GPa (点線), 25 GPa (太線))。細線は等温線。(Brg : Bridgmanite, St : Stishovite, Pc : Periclase, L : Liquid)

Oral presentation

R3: High-pressure science and deep Earth's material

Chairperson: Takaaki Kawazoe (Hiroshima University), Takeshi Sakai (Ehime University), Masayuki Nishi (Osaka University)

Sat. Sep 16, 2023 9:00 AM - 12:00 PM 822 (Sugimoto Campus)

10:30 AM - 10:45 AM

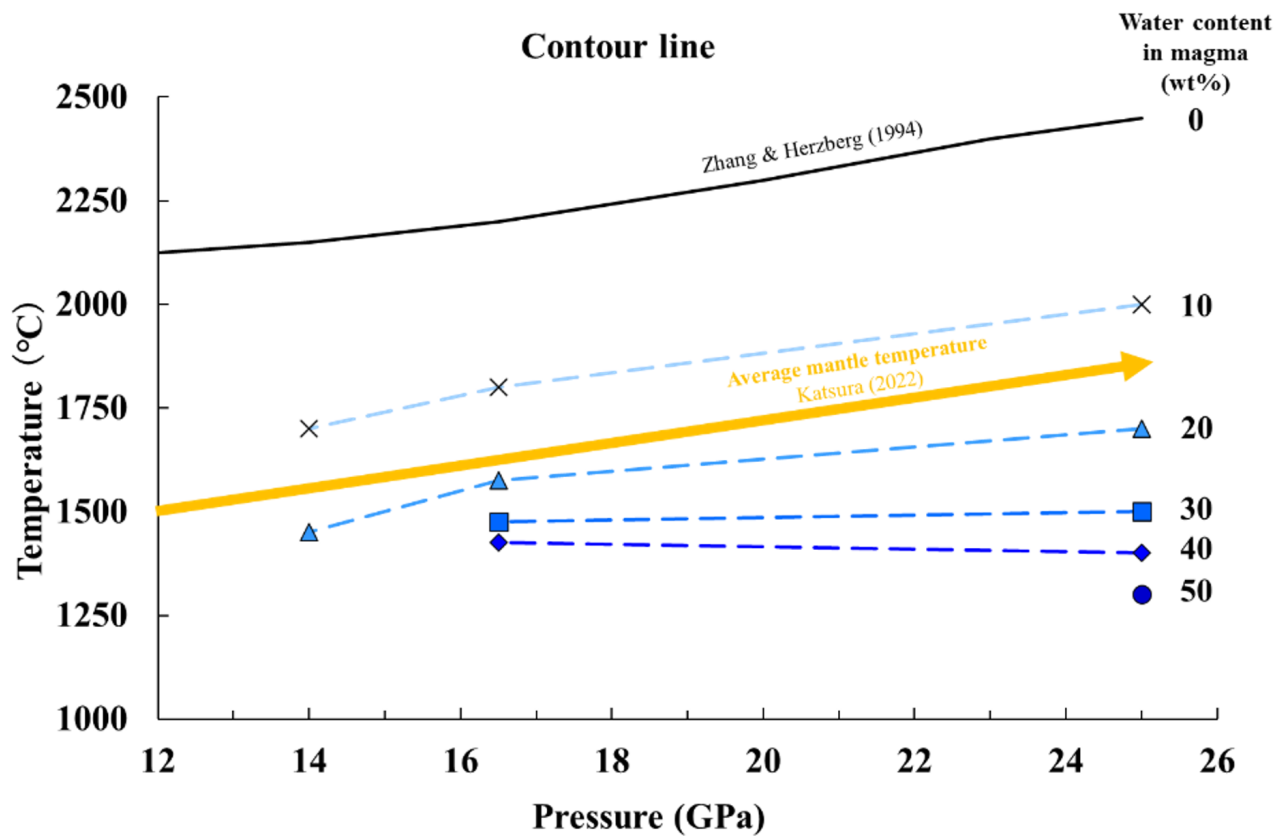
[3Lecture-301-11-7add]休憩

Water content profile of magma in the mantle transition zone predicted from high-pressure, high-temperature experiments

*Yusuke Egi¹, Toru Inoue¹, Kota Okumura¹, Takaaki Kawazoe¹

1. Hiroshima Univ. Sci.

Keywords: Water content in magma



図：各温度圧力で生成する含水マグマの等含水量線←

Elastic anomaly at the spin transition in ferropericlase: Revisited by GHz-DAC Ultrasonic Velocity Measurement newly developed

*Takuto Kato¹, Akira Yoneda¹, Tadashi Kondo¹, Daisuke Yamazaki²

1. Osaka Univ. Sci., 2. Okayama. IPM

Keywords: Ferropericlase, Spin transition, GHz method, Diamond Anvil Cell

Iron-Water Exchange at the Earth's Core-Mantle Boundary

*Katsutoshi Kawano¹, Masayuki Nishi¹, Sho Kakizawa², Toru Inoue³, Hideharu Kuwahara⁴,
Tadashi Kondo¹

1. Osaka Univ. Sci, 2. JASRI, 3. Hiroshima Univ. Sci, 4. Ehime Univ. GRC

Keywords: ultralow velocity zones, multi-anvil apparatus experiment, bridgmanite, ferropericlase, water

Increase of hydrogen-induced volume expansion by incorporation of Si into iron and the effect in estimated hydrogen content in the Earth's core

*Yuichiro MORI¹, Hiroyuki Kagi¹, Katsutoshi Aoki¹, Masahiro Takano¹, Sho Kakizawa², Asami Sano³, Ken-ichi Funakshi⁴

1. UTokyo, 2. JASRI, 3. J-PARC Center, JAEA, 4. CROSS

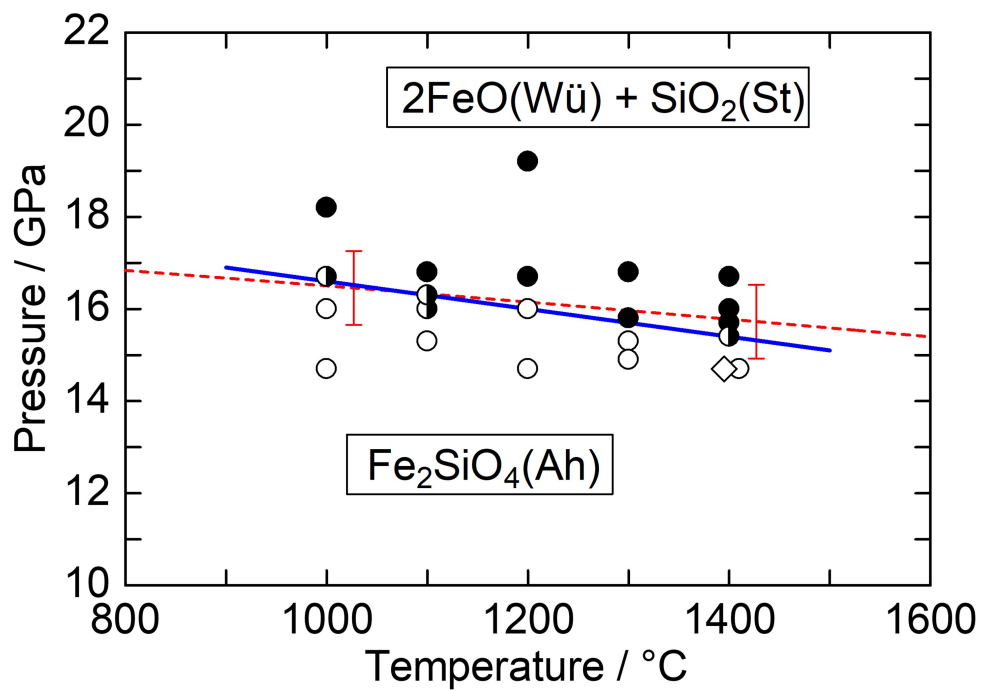
Keywords: High-pressure experiments, Neutron diffraction, Light element in the core, Hydrogen, Silicon

Post-spinel transition of Fe_2SiO_4 ahrensite at high pressure and high temperature

*Masaki AKAOGI^{1,2}, Natsuki MIYAZAKI¹, Taisuke TAJIMA¹, Hiroshi KOJITANI¹

1. Gakushuin Univ. Sci. , 2. Univ. Tokyo Sci.

Keywords: Post-spinel transition , ahrensite, high-pressure experiment, thermodynamic calculation



Oral presentation

R3: High-pressure science and deep Earth's material

Chairperson: Takaaki Kawazoe (Hiroshima University), Takeshi Sakai (Ehime University), Masayuki Nishi (Osaka University)

Sat. Sep 16, 2023 9:00 AM - 12:00 PM 822 (Sugimoto Campus)

[zoom]Zoom

Zoom

Oral presentation | R6: Plutonic rocks, volcanic rocks and subduction factory

📅 Sat. Sep 16, 2023 10:15 AM - 12:00 PM JST | Sat. Sep 16, 2023 1:15 AM - 3:00 AM UTC | 🏠 820 Sugimoto Campus

R6: Plutonic rocks, volcanic rocks and subduction factory

Chairperson: Takashi Yuguchi, Atsushi Kamei

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[R6-01] Igneous activity formed meta-granitoid in the Tenmondai rocks of the Lützow-Holm complex, East Antarctica

*Atsushi KAMEI¹, Momo Ichikawa¹, Tomokazu Hokada², Kenichiro Tani³, Ippei Kitano⁴, Sotaro Baba⁵, Nugroho I. Setiawan⁶, Prayath Nantasin⁷, Davaa-ochir Dashbaatar⁸, Yoichi Motoyoshi² (1. Shimane University, 2. National Institute of Polar Research, 3. National Museum of Nature and Science, 4. Hokkaido University, 5. University of the Ryukyus, 6. Universitas Gadjah Mada, 7. Kasetsart University, 8. Mongolian University of Science and Technology)

10:30 AM - 10:45 AM JST | 1:30 AM - 1:45 AM UTC

[R6-02] Mafic veins in the mantle section recovered during Oman Drilling Project: products of backarc spreading?

*Yuji ICHIYAMA¹, Hisatoshi Ito², Akihiro Tamura³, Tomoaki Morishita³ (1. Chiba University, 2. Central Research Institute of Electric Power Industry, 3. Kanazawa University)

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[R6-03] Muographic study of the oceanic crust-mantle density structure of the Oman Ophiolite

*Susumu UMINO¹, Hiroyuki Tanaka², László Oláh², Dezső Varga⁴, Tomoaki Morishita¹, Yoshihiro Hiramatsu¹, Yuki Kusano³ (1. Kanazawa University, 2. University of Tokyo, 3. AIST, 4. Wigner Research Center for Physics)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[R6-04] Magma genesis of the Iwafune diorites, Ibaraki Prefecture

[Presentation award entry]

*Haruki YAMAZAKI^{1,2}, Terumi EJIMA^{1,2}, Yoshiaki KON² (1. Shinshu Univ. Sci., 2. GSJ, AIST)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[R6-05] Zircon U-Pb age combined with trace element geochemistry constraining the source of Miocene granitoids of the Kagoshima Prefecture, Japan

*Hafiz Ur REHMAN¹, Marimo NAKABAYASHI¹, Yuki OTA¹, Kaushik DAS², Chung Sun LIN³, Hao YANG LEE³, Daisuke YAMASHITA⁴, Hiroshi YAMAMOTO¹ (1. Kagoshima Uni., 2. Hiroshima Uni., 3. IES, Academia Sinica, Taiwan, 4. Satsumasendai Kosh. Mus.)

11:30 AM - 11:45 AM JST | 2:30 AM - 2:45 AM UTC

[R6-06] Chronological re-examination of the Kanmon Group, Southwest Japan: and remaining unsolved problems

*Yukiyasu TSUTSUMI¹, Ryo Hasegawa², Yukio Isozaki³ (1. National Museum of Nature and Science, 2. FUJIFILM Business Innovation Corp., 3. Graduate school of Arts and Sciences, University of Tokyo)

11:45 AM - 12:00 PM JST | 2:45 AM - 3:00 AM UTC

[R6-07] U-Pb zircon age of granitoids in the Aoyama area, Ryoke belt, SW Japan

*Fumiko HIGASHINO¹, Tetsuo KAWAKAMI¹, Shuhei SAKATA², Shunpei Kudo¹, Yohei IGAMI¹ (1. Kyoto Univ. Sci., 2. Univ. Tokyo)

[zoom] Zoom

Igneous activity formed meta-granitoid in the Tenmondai rocks of the Lützow-Holm complex, East Antarctica

*Atsushi KAMEI¹, Momo Ichikawa¹, Tomokazu Hokada², Kenichiro Tani³, Ippei Kitano⁴, Sotaro Baba⁵, Nugroho I. Setiawan⁶, Prayath Nantasin⁷, Davaa-ochir Dashbaatar⁸, Yoichi Motoyoshi²

1. Shimane University, 2. National Institute of Polar Research, 3. National Museum of Nature and Science, 4. Hokkaido University, 5. University of the Ryukyus, 6. Universitas Gadjah Mada, 7. Kasetsart University, 8. Mongolian University of Science and Technology

Keywords: Meta-granitoid, Tenmondai rocks, Lützow-Holm complex, East Antarctica

Mafic veins in the mantle section recovered during Oman Drilling Project: products of backarc spreading?

*Yuji ICHIYAMA¹, Hisatoshi Ito², Akihiro Tamura³, Tomoaki Morishita³

1. Chiba University, 2. Central Research Institute of Electric Power Industry, 3. Kanazawa University

Keywords: Oman ophiolite, Oman Drilling Project, Mafic veins, Backarc spreading

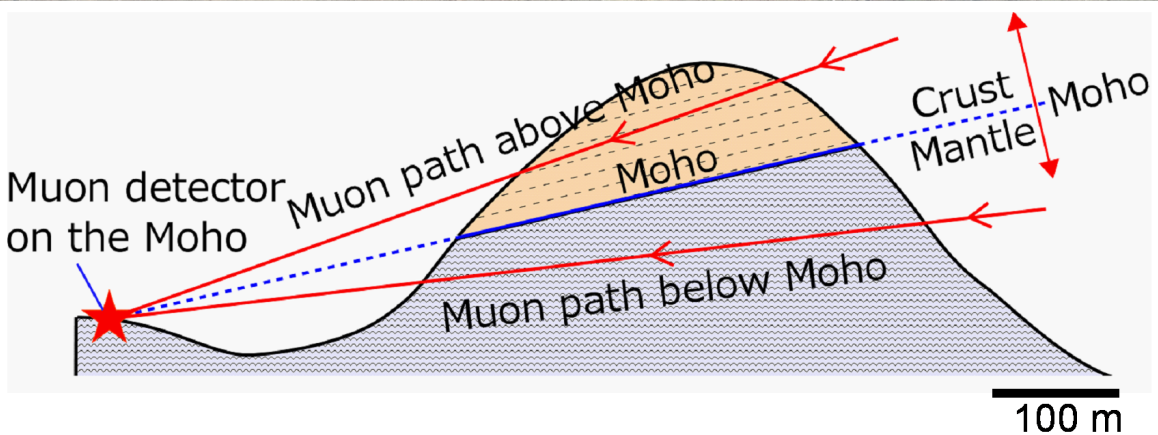
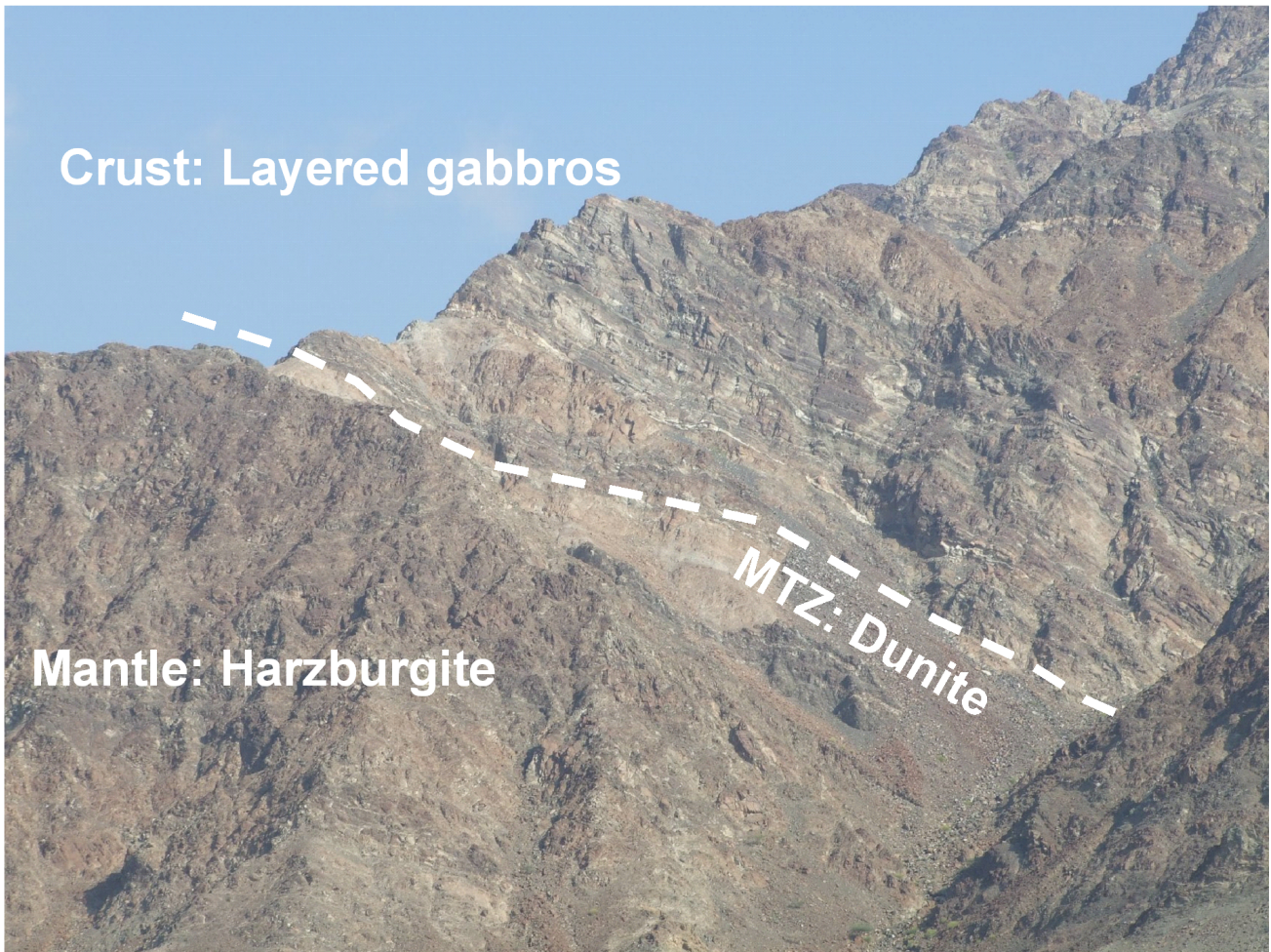
Muographic study of the oceanic crust-mantle density structure of the Oman Ophiolite

*Susumu UMINO¹, Hiroyuki Tanaka², László Oláh², Dezső Varga⁴, Tomoaki Morishita¹, Yoshihiro Hiramatsu¹, Yuki Kusano³

1. Kanazawa University, 2. University of Tokyo, 3. AIST, 4. Wigner Research Center for Physics

The oceanic lithosphere is divided into crust (layers 1-3) and mantle (layer 4) according to seismic wave reflection surfaces and velocity structures. The Layer 1-2 boundary corresponds to the boundary between sediment and basement rock. On the other hand, the Layer 2-3 boundary (upper-lower crustal boundary) and the Layer 3-4 boundary (Moho) are not well understood due to difficulties in observation and lack of basic understanding of geology and lithology. The Layer 2, 3, and 4 have been correlated with the extrusive rocks and sheeted dikes, gabbros, and peridotites, respectively, based on comparison with ophiolite geology. However, in Hole 504B, the only deep-sea drilling that penetrated the Layer 2-3 boundary, the boundary is located in the middle of the sheeted dike complex, which is attributed to alteration and reduced porosity^a. Hole 1256D penetrated into the gabbros, however, the Layer 2-3 boundary has not been reached yet^b. The drilling through the Moho and into the mantle is the flagship research project of the next IODP and the most important target of the Project Mohole, but it has not yet been accomplished. Therefore, comparative study of ophiolites is the only clue to understanding the relationships between seismic velocity structure and geology. In particular, the Oman ophiolite, the largest and best preserved in the world, has been intensely studied as an analogue of the fast spread crust and mantle. Kanazawa University, the University of Tokyo, Wigner Research Center for Physics in Hungary, and the Ministry of Energy and Minerals of the Sultanate of Oman are collaborating in an international joint project to image the lithologic boundaries of the Oman Ophiolite, corresponding to the crust-mantle boundary, upper-lower crust boundary, and layer 2A-2B boundary, on the scale of 100 m to km, which can be directly compared with the seismic structure. This presentation will give an overview of the project and the results of preliminary investigations.

Keywords: Muography, Oman Ophiolite, Oceanic crust - Mantle, Moho transition zone, density structure



Muon detectors installed on the Moho acquire muon signals passing through the target.

Magma genesis of the Iwafune diorites, Ibaraki Prefecture

*Haruki YAMAZAKI^{1,2}, Terumi EJIMA^{1,2}, Yoshiaki KON²

1. Shinshu Univ. Sci., 2. GSJ, AIST

It is important to reveal the magma genesis of plutonic rocks in Southwest Japan during Late Cretaceous to Paleogene to understand crustal growth in Japan because large amounts of plutonic rocks were formed in this age. However, the magma genesis of diorite in eastern Southwest Japan has not been reported. Because of its large surface exposure area, the Iwafune diorite represents diorite in this region. Therefore, we reveal the primitive melt genesis of the Iwafune diorite to understand magma genesis in this region. The Iwafune pluton consists of diorite, orthopyroxene (opx) diorite, and granite. The opx diorites are lower SiO₂ contents and higher enstatite contents of pyroxene than the diorite. The compositional variation of the Iwafune diorite can be explained by the fractional crystallization of clinopyroxene and plagioclase from the opx diorite (Yamazaki et al., 2023). Therefore, the opx diorite composition is the closest to the primitive melt composition of the Iwafune diorite.

In order to consider the genesis of the primitive melt of the Iwafune diorite, the Sr isotopic ratios of the upper mantle were estimated to be Sr_l of the gabbro in the Tsukuba Mountains (Arakawa and Takahashi, 1989; Shibata and Ishihara, 1979). The Sr isotopic ratios of the lower crust were estimated to be the Sr_l of the granites in this area (Arakawa and Takahashi, 1989; Shibata and Ishihara, 1979). The Sr_l of the Iwafune diorite (Shibata and Takagi, 1989) is different from the Sr isotopic ratios of the upper mantle, but it is equal to the Sr isotopic ratios of the lower crust. These results suggest that the primitive melt of the Iwafune diorite was formed by partial melting of the lower crust.

We examined whether partial melting of the lower crust would form the primitive melt composition of the Iwafune diorite. Because the HREE contents of the opx diorites are not depleted, and the temperature of the lower crust is 500-700°C (Coinde, 2005), we estimate that the lower crust was not saturated with water at about 0.8 GPa when the Iwafune diorite formed. The composition of the melt, which is formed by the partial melting of basalt under these physical conditions (Rapp and Watson, 1995), is nearly equal to the composition of the opx diorite.

Therefore, we conclude that the primitive melt of the Iwafune diorite was most likely formed by partial melting of the lower crust.

Keywords: Diorite, Magma genesis, Iwafune pluton, Tsukuba Mountains

Zircon U-Pb age combined with trace element geochemistry constraining the source of Miocene granitoids of the Kagoshima Prefecture, Japan

*Hafiz Ur REHMAN¹, Marimo NAKABAYASHI¹, Yuki OTA¹, Kaushik DAS², Chung Sun LIN³, Hao YANG LEE³, Daisuke YAMASHITA⁴, Hiroshi YAMAMOTO¹

1. Kagoshima Uni., 2. Hiroshima Uni., 3. IES, Academia Sinica, Taiwan, 4. Satsumasendai Kosh. Mus.

This study reports zircon U-Pb age and trace element geochemistry of the Miocene granitoids exposed in Kagoshima to constrain their magmatic source. More than 150 zircon grains were U-Pb age-dated along with trace element contents from four plutons (#1. Osumi, #2. Takakuma Yama, #3. Shibi san, and #4. Koshikishima). Zircon grains from Osumi yielded U-Pb age values in the range from 13.4 ~ 15.8 Ma in sample OsG-3, 13.9 ~ 16.8 Ma in OsG-9, 13.3 ~ 14.7 in OsG-12, 14.2 ~ 16.4 in OsG-36. Zircons from Takakuma Yama yielded ages of 12.7 ~ 15.2 Ma from TkG-1 and 12.8 ~ 15.9 Ma in TkG-2. Shibi Pluton yielded ages of 12.7 ~ 14.3 Ma and a hornfels sample (Shb-19) yielded U-Pb age scattered between 13.9 and 206 Ma, with three spots giving values of 1803 Ma, 1873 Ma, and 2194 Ma from the detrital core domains. Zircons separated from Koshikishima Island yielded relatively younger age of 9 ~ 12 Ma in Kos-2, 8.8 ~ 12.1 Ma in Kos-11, 7.8 ~ 10.4 Ma in Kos-19, 8.7 ~ 10.6 Ma in Kos-30, 9.3 ~ 11.4 Ma in Kos-35, and 9.4 ~ 12.3 Ma in Kos-42. Trace element data of zircons, particularly, rare-earth elements, show typical magmatic type patterns with pronounced positive Ce and negative Eu anomalies. Ti-in-zircon thermometry data revealed temperature of crystallization ranging from 609 ~ 895 °C, with majority of grains showing fall within 650 to 780 °C range. Age-data from plutons #1~3 are more or less identical and suggest Miocene magmatism possibly due to the trench-parallel ridge subduction that triggered partial melting in the overlying continental crust. Proterozoic cores suggest incorporation of the recycled crust during the magma formation. Pluton #4, yielding relatively younger age, may have resulted from partial melting of crust enriched in mafic component. Zircon trace element data, along with whole-rock major and trace element contents, also indicate the involvement of mafic component to generate the Koshikishima granitoids in a different tectonic scenario than the others.

Keywords: Zircon, U-Pb age, Miocene, Kagoshima Prefecture, Koshikishima

Chronological re-examination of the Kanmon Group, Southwest Japan: and remaining unsolved problems

*Yukiyasu TSUTSUMI¹, Ryo Hasegawa², Yukio Isozaki³

1. National Museum of Nature and Science, 2. FUJIFILM Business Innovation Corp., 3. Graduate school of Arts and Sciences, University of Tokyo

Stratigraphic studies were capable in fore arc sediments because they consist mainly of marine sediments which contain index fossils and radiolarian fossils. Whereas intra- and back-arc sediments which consist of terrestrial sediments had no other choice than to correlate fresh-water fauna and/or apply radiometric ages which have low reliability. After decades of developments, zircon U-Pb age method expand application. It is applied not only to clarify eruption/deposition age of tuff beds but also age limitation and provenance studies of clastic rocks.

The Kanmon Group is the one of the intra-arc sediments. Although detrital zircon dating is also applied, it is not statistically significant because of too small number of analyses to interpret. To re-examination of the deposition ages and provenances of the Kanmon Group, we analyzed detrital zircon ages. Age results of this study were shown in the Table and Fig. (A).

New obtained YC1 σ of the Sujigahama and Shihama formations indicate 97 Ma and 101 Ma, respectively. Moreover, considering the age of the Kawara granite (94.8 ± 0.9 Ma), the age of the upper most of the Shimonoseki Subgroup is thought to be in Cenomanian. On the other hand, YC1 σ of the Sengoku Formation, the lowermost of the Wakino Subgroup and the Yoshimo Formation, Toyonishi Group indicate similar values of 128 Ma and 130 Ma, respectively. The fact exhibits that the formations are contemporaneous heterotopic facies each other.

Contradictions about ages are also shown. "The age of the tuff bet" in the Kitahikoshima Formation was reported as 106.3 ± 1.0 Ma which is older than YC1 σ of the Shiohama Formation which is stratigraphically lower than the Kitahikoshima Formation. The contradiction can be solved to think that the zircon grains were detrital origin and which YC1 σ indicate 99.3 ± 1.3 Ma. Another contradiction is that the Lower Wakamiya Formation is too young. Additional research is necessary to solve the contradiction.

Keywords: Kanmon Group, detrital, zircon age, sandstone, tuff

Table. Youngest age indexes for detrital zircons from each sample.

Sample	n of data		YSG		YC1 σ			YC2 σ			
	All	Conc.	Age (Ma)	Age (Ma)	n	MSWD	Age (Ma)	n	MSWD		
Kanmon Group											
SJ*	Sujigahama Fm.		47	33	99.9 \pm 1.9	101.0 \pm 0.8	3	0.64	103.2 \pm 0.4	9	2.16
SJH	Sujigahama Fm.		168	160	94.4 \pm 1.7	96.6 \pm 0.6	9	0.35	99.2 \pm 0.3	42	0.92
SHI*	Shiohama Fm.		39	28	98.1 \pm 1.1	98.7 \pm 0.6	2	0.44	100.0 \pm 0.5	5	2.36
SOH	Shiohama Fm.		155	148	98.4 \pm 2.3	101.3 \pm 0.9	30	0.43	104.6 \pm 0.5	102	1.15
GMO	Kumagai Fm. (Eq. Upper Wakamiya Fm.)		56	47	102.1 \pm 2.3	113.9 \pm 0.9	2	0.93	113.5 \pm 0.7	4	3.12
WA*	Lower Wakamiya Fm.		37	22	105.2 \pm 1.0	105.5 \pm 0.9	2	0.41	107.2 \pm 0.5	4	2.05
SG	Sengoku Fm.		170	157	126.4 \pm 3.3	127.6 \pm 1.9	2	0.19	177.1 \pm 0.9	10	3.30
Toyonishi Group											
YM*	Yoshimo Fm.		33	28	125.2 \pm 1.8	221.8 \pm 2.0	2	0.21	226.4 \pm 1.4	3	6.02
YSM	Yoshimo Fm.		117	98	127.7 \pm 1.7	129.7 \pm 1.1	3	1.23	130.4 \pm 0.9	4	1.51
KS*	Kiyosue Fm.		60	55	124.6 \pm 1.1	135.4 \pm 0.8	3	0.66	135.4 \pm 0.8	3	0.66

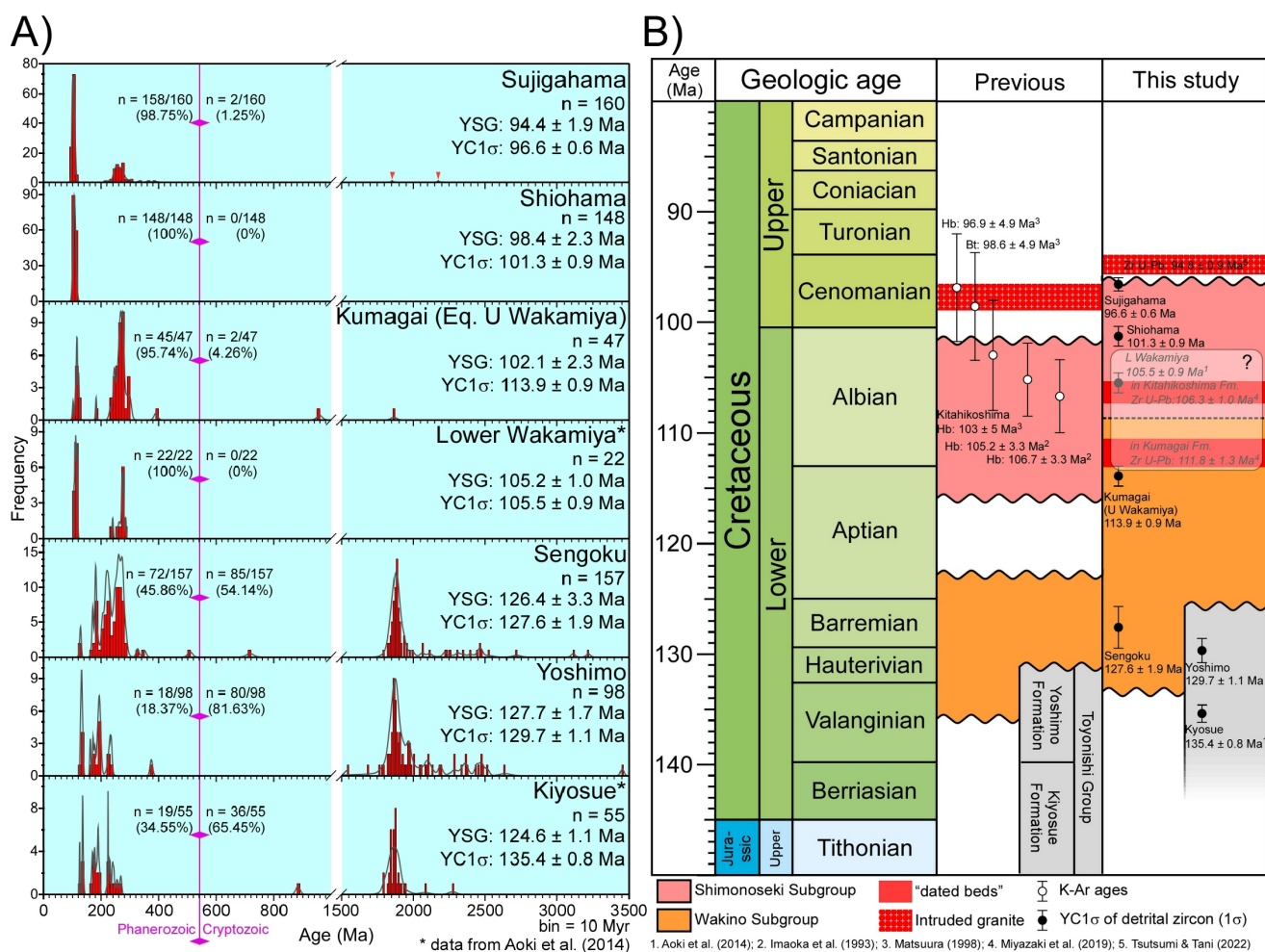
Errors are 1 σ , *: data from Aoki et al. (2014)

Figure. (A) Probability density diagrams and histograms of concordant age data from each sample. ^{238}U - ^{206}Pb * ages are used for less than or equal to 1000 Ma data and ^{207}Pb */ ^{206}Pb * ages are used for the other data. (B) Stratigraphic charts of Kanmon Group. Previous age estimation is modified after Matusmoto et al. (1982).

U-Pb zircon age of granitoids in the Aoyama area, Ryoke belt, SW Japan

*Fumiko HIGASHINO¹, Tetsuo KAWAKAMI¹, Shuhei SAKATA², Shunpei Kudo¹, Yohei IGAMI¹

1. Kyoto Univ. Sci., 2. Univ. Tokyo

The Ryoke belt shows an elongated distribution over 800 km in Southwest Japan, which is mainly composed of Late Cretaceous high-*T*/low-*P* type metamorphic rocks and plutonic rocks. Whereas the early geochronological studies report eastward younging of Rb-Sr whole rock ages of granitic rocks [e.g., 1, 2], some U-Pb zircon ages and chemical Th-U-total Pb isochron method (CHIME) monazite ages of granitoids are not consistent with the trend [3, 4]. The Aoyama area is one of the well-studied areas in the Ryoke belt, where high-grade pelitic and psammitic metamorphic rocks and granitoids are widely exposed. Since it is apparent that the U-Pb zircon ages of granitoids are not sufficiently available to understand the spatiotemporal evolution of magmatism in the Aoyama area, we performed LA-ICPMS zircon U-Pb dating for six samples out of five granitoids.

Magmatic zircon domains were selected based on microstructural constraint under CL images. Using analyses with concordance between 97-103 %, the weighted-mean U-Pb age is only calculated for one sample. As a result, crystallization timings of granitoids are constrained respectively as ca. 83-75 Ma for Kabuto granodiorite, ca. 76-65 Ma and ca. 77-70 Ma for Ao granite, ca. 92-84 Ma for Joryu tonalite, 75 ± 1 Ma for Misugi tonalite, and ca. 110-99 Ma for Kimigano granodiorite.

Zircon in the Misugi tonalite has a multi-phase inclusion composed of cristobalite, kumdykolite, apatite and glass. Mineral assemblage of cristobalite and kymdykolite is reported in nanogranite in garnet from high-*T* metamorphic rock, which is interpreted to be metastable phases [5]. These minerals found in this study are also considered to be metastable, suggesting rapid crystallization from the granitic melt. Further analyses for inclusion in zircon would help understand the range of crystallization timing of granitoids.

[1] Nakajima (1994) *Lithos* [2] Nakajima et al. (1990) *CMP* [3] Suzuki & Adachi (1998) *JMG* [4] Takatsuka et al. (2018) *Island Arc* [5] Ferrero et al. (2016) *CMP*

Keywords: granite, zircon, melt inclusion, metastable phase

Oral presentation

R6: Plutonic rocks, volcanic rocks and subduction factory

Chairperson: Takashi Yuguchi, Atsushi Kamei

Sat. Sep 16, 2023 10:15 AM - 12:00 PM 820 (Sugimoto Campus)

[zoom]Zoom

Zoom

Oral presentation | R5: Extraterrestrial materials

📅 Sat. Sep 16, 2023 2:00 PM - 3:00 PM JST | Sat. Sep 16, 2023 5:00 AM - 6:00 AM UTC | 🏢 821 Sugimoto Campus

R5: Extraterrestrial materials

Chairperson: Megumi Matsumoto, Daiki Yamamoto, Yusuke Seto, Shogo Tahibana

2:00 PM - 2:15 PM JST | 5:00 AM - 5:15 AM UTC

[R5-12] Chemical Composition of Circumstellar Amorphous Silicate Dust: Condensation Experiments in the Na-Mg-Al-Si-Ca-Fe-Ni-O System

*Hanako Enomoto¹, Aki Takigawa¹ (1. UTokyo)

2:15 PM - 2:30 PM JST | 5:15 AM - 5:30 AM UTC

[R5-13] Survivability of presolar SiC grains in the protosolar disk: An experimental study

*Daiki YAMAMOTO¹, Aki TAKIGAWA², Shogo TACHIBANA² (1. Kyushu University, 2. University of Tokyo)

2:30 PM - 2:45 PM JST | 5:30 AM - 5:45 AM UTC

[R5-14] Antarctic micrometeorites containing pseudomorphs of melanophlogite: Dust from the sub-surface ocean of icy satellites or from an unknown type of trans-Neptunian objects?

*Takaaki NOGUCHI¹, Takuya Mitsunari^{2,3}, Rikako Matsumoto^{4,5}, Akira Yamaguchi⁶, Naoya Imae⁶, Toru Matsumoto¹, Toru Araki⁷, Hayato Yuzawa⁷, Akira Miyake¹ (1. Kyoto Univ. Sci., 2. Ibaraki Univ. Sci., 3. Mitsubishi Elect. Soft. Co., 4. Kyushu Univ. Sci., 5. Ine T.H., 6. NIPR, 7. IMS)

2:45 PM - 3:00 PM JST | 5:45 AM - 6:00 AM UTC

[R5-15] **Studies of Earth's minerals and rocky mixtures beyond Earth**

*Yasunori MIURA¹ (1. Post Yamaguchi Univ. Sci.)

[zoom] Zoom

Chemical Composition of Circumstellar Amorphous Silicate Dust: Condensation Experiments in the Na-Mg-Al-Si-Ca-Fe-Ni-O System

*Hanako Enomoto¹, Aki Takigawa¹

1. UTokyo

Keywords: circumstellar dust, amorphous silicate, experiment

表 1 出発物質の化学組成

実験	Mg	Si	Fe	Al	Ca	Na	Ni
CI-02	1.03	1.00	0.85	0.08	0.06	0.06	0.05
CI-03	1.03	1.00	-	0.08	0.06	0.06	-
CI-04	1.03	1.00	-	0.75	0.06	0.06	-
Al ₈ Si ₁₀₀ Mg ₁₀₃	1.03	1.00	-	0.08	-	-	-
Al ₃₁ Si ₁₀₀ Mg ₁₀₃	1.03	1.00	-	0.31	-	-	-
Al ₆₄ Si ₁₀₀ Mg ₁₀₃	1.03	1.00	-	0.64	-	-	-
Al ₈ Si ₁₀₀ Ca ₁₀₃	-	1.00	-	0.08	1.03	-	-
Al ₈ Si ₁₀₀ Mg _{51.5} Ca _{51.5}	0.515	1.00	-	0.08	0.515	-	-

Survivability of presolar SiC grains in the protosolar disk: An experimental study

*Daiki YAMAMOTO¹, Aki TAKIGAWA², Shogo TACHIBANA²

1. Kyushu University, 2. University of Tokyo

Keywords: Presolar grains, Silicon carbide (SiC), Evaporation/Oxidation, Kinetics, Protosolar disk

Antarctic micrometeorites containing pseudomorphs of melanophlogite: Dust from the sub-surface ocean of icy satellites or from an unknown type of trans-Neptunian objects?

*Takaaki NOGUCHI¹, Takuya Mitsunari^{2,3}, Rikako Matsumoto^{4,5}, Akira Yamaguchi⁶, Naoya Imae⁶, Toru Matsumoto¹, Toru Araki⁷, Hayato Yuzawa⁷, Akira Miyake¹

1. Kyoto Univ. Sci., 2. Ibaraki Univ. Sci., 3. Mitsubishi Elect. Soft. Co., 4. Kyushu Univ. Sci., 5. Ine T.H., 6. NIPR, 7. IMS

Keywords: AMM, melanophlogite, sub-surface ocean, solar flare track

Studies of Earth' s minerals and rocky mixtures beyond Earth

*Yasunori MIURA¹

1. Post Yamaguchi Univ. Sci.

Minerals of the Earth are formed by active state changes in the three state zones. Without an extraterrestrial ocean system, Earth type mineral is difficult to form. There are local and global phenomena on the Earth, though the formation of the global solid systems requires the ocean system. It cannot be specified in meteorite classification unless it is used a macro- mineral name [1-3].

Keywords: Earth mineral , Rocky mixtures, Meteorite, The Moon, Ocean system

Oral presentation

R5: Extraterrestrial materials

Chairperson: Megumi Matsumoto, Daiki Yamamoto, Yusuke Seto, Shogo Tahibana

Sat. Sep 16, 2023 2:00 PM - 3:00 PM 821 (Sugimoto Campus)

[zoom]Zoom

Zoom

Oral presentation | R3: High-pressure science and deep Earth's material

📅 Sat. Sep 16, 2023 2:00 PM - 3:00 PM JST | Sat. Sep 16, 2023 5:00 AM - 6:00 AM UTC | 🏢 822 Sugimoto Campus

R3: High-pressure science and deep Earth's material

Chairperson: Takaaki Kawazoe (Hiroshima University), Takeshi Sakai (Ehime University), Masayuki Nishi (Osaka University)

2:00 PM - 2:15 PM JST | 5:00 AM - 5:15 AM UTC

[R3-12] High temperature formation of the oxygen-rich Martian core

*Eiji OHTANI¹, William F McDonough^{1,2} (1. Tohoku University, 2. University of Maryland)

2:15 PM - 2:30 PM JST | 5:15 AM - 5:30 AM UTC

[R3-13] Microtexture evolution of pure aluminum severely deformed at static high pressures

*Takuo OKUCHI^{1,2}, Yuto TANAKA^{2,1}, Naotaka TOMIOKA³, Tomokazu SANOKAWA⁴, Tomoki MATSUDA⁴, Kazuto ARAKAWA⁵, Yusuke SETO⁶ (1. Kyoto Univ. KURNS, 2. Kyoto Univ. Mech. Eng., 3. Kochi JAMSTEC, 4. Osaka Univ. Eng., 5. Shimane Univ. NEXTA, 6. Osaka Metropolitan Univ. Sci.)

2:30 PM - 2:45 PM JST | 5:30 AM - 5:45 AM UTC

[R3-14] **Quantitative chemical analysis of the fine textures of natural and synthetic materials using ATEM**

*Kiyoshi FUJINO¹, Naotaka TOMIOKA², Hiroaki OHFUJI³ (1. Non, 2. JAMSTEC, 3. Tohoku Univ.)

2:45 PM - 3:00 PM JST | 5:45 AM - 6:00 AM UTC

[R3-15] Synthesis of polycrystalline diamond from glassy carbon by direct conversion at high pressure and temperature

Chinatsu Ogawa¹, *Tetsuo Irifune¹, Sayako Inoue¹, Takehiro Kunimoto¹, Toru Shinmei¹, Akimasa Suzumura², Shoichi Itoh² (1. Ehime University, 2. Kyoto University)

[zoom] Zoom

High temperature formation of the oxygen-rich Martian core

*Eiji OHTANI¹, William F McDonough^{1,2}

1. Tohoku University, 2. University of Maryland

Discovery of a large Martian core with a large radius and low mean density around $6\sim 6.5\text{ g/cm}^3$ provided a new constraint for the composition of the Martian core. The early Martian core formation inferred from W-Hf data of SNC meteorites revealed that the fractionation and core formation of Mars occurred within the first 5 million years after the CAI formation, resulting in the super-liquidus temperature during the core formation stage of Mars due to existence of radiogenic element such as ^{26}Al in the early solar system. The metallic iron-silicate partitioning of oxygen and sulfur indicates a high concentration of oxygen at high temperature 400-600 K above the liquidus of the Martian mantle. Thus, the major light elements in the Martian core may be oxygen instead of sulfur, which can account for the observed density and compressional velocity of the Martian core. Liquid immiscibility in the Fe-O-S Martian core during cooling may explain the evolution and extinction of the Martian core dynamo.

Keywords: Martian core, Oxygen, liquid immiscibility

Microtexture evolution of pure aluminum severely deformed at static high pressures

*Takuo OKUCHI^{1,2}, Yuto TANAKA^{2,1}, Naotaka TOMIOKA³, Tomokazu SANO⁴, Tomoki MATSUDA⁴, Kazuto ARAKAWA⁵, Yusuke SETO⁶

1. Kyoto Univ. KURNS, 2. Kyoto Univ. Mech. Eng., 3. Kochi JAMSTEC, 4. Osaka Univ. Eng., 5. Shimane Univ. NEXTA, 6. Osaka Metropolitan Univ. Sci.

Keywords: Microtexture of metal, Static high pressure, Stress field, Dislocation, Aluminium

Quantitative chemical analysis of the fine textures of natural and synthetic materials using ATEM

*Kiyoshi FUJINO¹, Naotaka TOMIOKA², Hiroaki OHFUJI³

1. Non, 2. JAMSTEC, 3. Tohoku Univ.

Keywords: Analytical TEM, Quantitative chemical analysis, Absorption correction

Synthesis of polycrystalline diamond from glassy carbon by direct conversion at high pressure and temperature

Chinatsu Ogawa¹, *Tetsuo Irifune¹, Sayako Inoue¹, Takehiro Kunimoto¹, Toru Shinmei¹, Akimasa Suzumura², Shoichi Itoh²

1. Ehime University, 2. Kyoto University

Synthesis and characterization of polycrystalline diamond from bulk samples of glassy carbon have been made at pressures 9, 12, and 15 GPa and temperatures from 1800 to 2300°C using multi-anvil apparatus. The minimum temperature for synthesis of pure polycrystalline diamond was determined as 1700°C at 15 GPa, which significantly increases with decreasing pressure and reaches 2300°C at 12 GPa and the minimum temperature is suggested to be even higher than 3000°C at 9 GPa based on the present and earlier studies. TEM observations on some recovered samples show developments of graphitic layers in the disorganized nano-structures of original glassy carbon, particularly in those samples synthesized at temperatures around 2000°C at 9 and 12 GPa. The significant increase in the minimum temperature with decreasing pressure may be due to the metastable growth of graphitic layers in glassy carbon, which should kinetically hinder complete conversion to diamond at the lower pressures approaching the graphite-diamond phase boundary.

Keywords: diamond, high-pressure synthesis, nano-polycrystals, glassy carbon, TEM observations

Oral presentation

R3: High-pressure science and deep Earth's material

Chairperson: Takaaki Kawazoe (Hiroshima University), Takeshi Sakai (Ehime University), Masayuki Nishi (Osaka University)

Sat. Sep 16, 2023 2:00 PM - 3:00 PM 822 (Sugimoto Campus)

[zoom]Zoom

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