Newsletter of the Global COE program

Deep Earth Mineralogy

Center for Advanced Experimental and Theoretical Deep Earth Mineralogy
先進的実験と理論による地球深部物質学拠点

No. 1, January 30, 2009

Message from the program leader

Tetsuo IRIFUNE
Professor and Director of Geodynamics Research Center, Ehime University

"Global Center of Excellence (COE) Program" aims at forming world-class research hubs in Japanese Universities with strong financial support by the Japanese government. We, a group of researchers in Ehime University (Geodynamics Research Center, GRC, and Geophysics division at Graduate School of Sciences), together with those of allied laboratories in University of Tokyo, Japan Synchrotron Research Institute (JASRI), and Stony Brook University (SBU) submitted a proposal entitled "Center for Advanced Experimental and Theoretical Deep Earth Mineralogy" for this highly cutting-throat competition.

This proposal has been selected as one of 3 successful programs in Earth science field, in which we will advance cutting-edge sciences in deep Earth mineralogy, focusing on the topics represented by the keywords "lower mantle mineralogy", "core materials", and "deep Earth water". We will also conduct interdisciplinary studies, such as solid-state physics, inorganic chemistry, and materials science, utilizing the rich resources of high-pressure and other facilities at GRC. Moreover, new technologies in experimental and computational sciences relevant to these studies will also be developed in this program.

For instance, we will develop techniques to produce pressures of Mbar regime in multianvil apparatus using sintered diamond anvils, while the P, T conditions for precise determination of sound velocities, developed by the program member of SBU, will be extended to those of the lower mantle. Application of the newly produced nano-polycrystalline diamond (NPD or HIME-dia) to various types of high-pressure apparatus will also be pursued in order to realize higher pressure and temperature generation in larger sample volumes as compared to those available in conventional high-pressure apparatus. We will also focus on the development of techniques relevant to the applications of "quantum-beams" in deep Earth mineralogy, particularly those of synchrotron and neutron available at SPring-8 and at J-PARC, respectively, in collaboration with the program members of JASRI and Univ. Tokyo.

The new experimental data based on these techniques will be examined with first-principles calculations by the numerical simulation group of GRC, while the predictions based on the latter studies will in turn guide the experimental exploration of the behavior of Earth's materials at very high pressure and temperature. Moreover, these data are used for realistic computer simulations of dynamics of the Earth, as well as for understanding the seismologically derived structures of the Earth's deep interior in the numerical simulation group.

Another important aim of our program is to train young scientists in deep Earth mineralogy and related fields. We will accept 15-20 PhD students and 20-30 post-doctoral fellows, including those from overseas, in experimental and theoretical deep Earth mineralogy, particularly in the fields of high-pressure mineral physics, quantum-beam applications, and first-principle computations during the period of the program. To this end, we will open a special course with exemption of the tuition and providing scholarships as well as significant research funds, in the Graduate School of Science of Ehime Univ., and annually invite up to 4 highly motivated foreign and Japanese PhD students at GRC for this program. We will have special training programs for these young scientists, including internships in the members' and other domestic and overseas laboratories, which have strong relations with GRC, such as having official agreement on the collaboration in research and education (i.e. GSECARS, Univ. Chicago; Bayerisches Geoinstitut, Univ. Bayreuth; Mineral Physics Institute, SUB; Laboratoire de Geologie, CNRS-ENS; Institute of Earth Sciences, National Chen Kung Univ.; RSES, Australian National University).

In addition to the above research and training activities, an important goal of our Global COE program is to form an international research/education network of deep Earth mineralogy in Asia region, in order to enhance international collaborations and exchange of people in this field. Although scientific and technological contributions from the Asian countries to the advancement in deep Earth mineralogy have been quite significant, we do not have any effective network platforms for mutual interactions among the researchers and students in these countries, such as those established in USA (COMPRES) and Europe (Crust to Core, c2c), in spite of the geographically close relations. Thus we plan to form a network (The Asian Network in Deep Earth Mineralogy, TANDEM) to combine unique techniques and facilities in individual laboratories in Asian region to develop new frontiers in deep Earth mineralogy as well as in training young scientists in this and related research fields.

Matsuyama, where GRC and the headquarters of the global COE program are located, is the largest city in southern main island of Shikoku in Japan. The famous hot spa, Dogo Onsen, and the beautiful Matsuyama castle on the hill are within the walking distances from the GRC office building, and you may also enjoy scenic views of hundreds of islands floating on the calm Seto inland sea near the city. This area is known as the modest climate throughout a year (though a little bit warm in summer), rich nature, low living costs, and is an ideal place to live in. We heartily welcome and invite those who wish to explore the secrets of the Earth's deep interior to our global COE program on Deep Earth Mineralogy. Bon voyage to the center of the Earth!

Global COE
DEEP EARTH MINERALOGY
EHIME UNIVERSITY JASRI, UNIV.TOKYO, SBU

Global COE starts!

On June 18, 2008, our Global COE program "Center for Advanced Experimental and Theoretical Deep Earth Mineralogy" has been accepted by Japan Society of the Promotion of Science (JSPS), as one of the three programs selected in the field of Earth and Planetary Sciences.

The press conference to announce the acceptance of the Global COE program (Mayayuki KOMATSU, president of Ehime Univ. and Tetsuo Irifune, program leader).

Program Members

Geodynamics Research Center, Ehime University

IRIFUNE, Testuo	High-pressure experiment
HANAYAMA, Yoichi	Ultrasonic measurement
INOUE, Toru	High-pressure experiment
TSUCHIYA, Taku	Theoretical mineral physics
KAMEYAMA, Masanori	Numerical mantle dynamics simulation
YAMADA, Akira	Global Seismology
OHFUJI, Hiroaki	High-pressure experiment
NISHIYAMA, Norimasa	High-pressure experiment

Graduate School of Science and Engineering, Ehime University

OHNO, Ichiro	Ultrasonic measurement
KAWASAKI, Toshisuke	High-pressure synthesis
YAMAMOTO, Akihiko	Tectonophysics

Research and Utilization Division, Japan Synchrotron Radiation Research Institute

FUNAKOSHI, Ken-ichi	Synchrotron experiment
HIGO, Yuji	Ultrasonic measurement

Geochemical Laboratory, University of Tokyo

KAGI, Hiroyuki	Neutron and optical spectroscopic measurement

Mineral Physics Institute, Stony Brook University

LI, Baosheng	Ultrasonic measurement

Faculty members and research/postdoctoral fellows at GRC, Ehime University.

The 1st Global COE International Frontier Seminar

"High-Pressure Neutron Scattering
for Material- and Geo-Sciences"
Lecturer: **Prof. Stefan Klotz**
(University P&M Curie, Paris)
Date: 29 August 2008

The 2nd Global COE International Frontier Seminar

"Lithospheric Edges and Structures"
Lecturer: **Prof. Brian Kennett**
(Australian National University,
Research School of Earth Sciences (RSES))
Date: 18 September 2008

The 3rd Global COE International Frontier Seminar

"Let's creep!
-- An experimental pursue for high-pressure rheology "
Lecturer: **Prof. Yanbin Wang**
(GeoSoilEnviroCARS, The University of Chicago)
Date: 21 November 2008

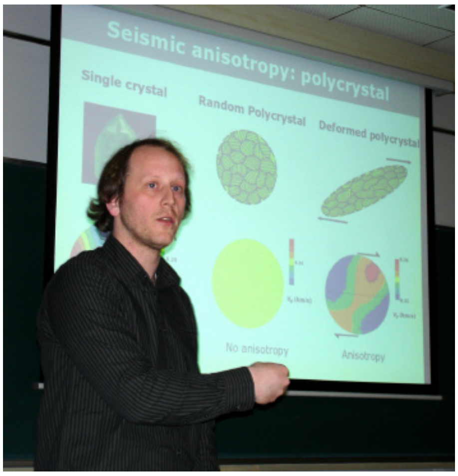
The 4th Global COE International Frontier Seminar

"Experimental investigation of plastic properties of high pressure minerals"

Lecturer: **Dr. Sébastian Merkel**

(CNRS, Université Lille 1, LSPES)

Date: 20 January, 2009



The 1st International Special Lecture

"Imaging Earth Structure"

Lecturer: **Prof. Brian Kennett**

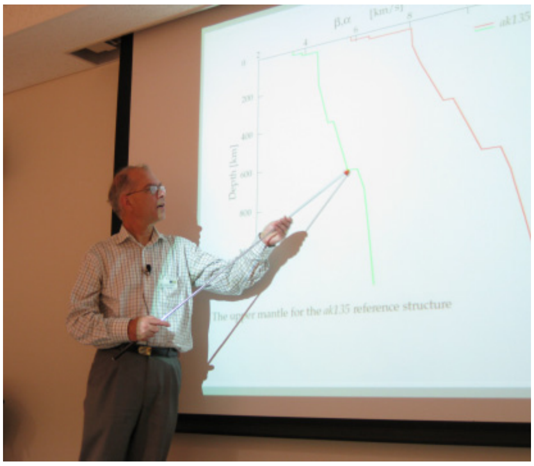
Australian National University,

Research School of Earth Sciences (RSES)

LECTURE I	18 September 2008 13:00-16:00
LECTURE II	19 September 2008 9:00-12:00

Venue: 6th floor, Integrated research Bldg, Ehime University

1 Introduction
2 The major elements of Earth structure
3 Seismic Waves
4 Probing the interior of the Earth
5 Elements of Seismic Tomography
6 The global seismic wavefield
7 Global Seismic Tomography
8 The seismic wavefield to 40 deg
9 Regional Seismic Tomography
10 Tomography and Earth Dynamics



The 1st Global COE Symposium

"Toward formation of The Asian Network in Deep Earth Mineralogy (TANDEM)

23-25 November, 2008, Ehime University

See pages 6 & 7 for a detailed report about the symposium.

Global COE Kick-off Forum

Lecturer: **Prof. Kazuo Oike**

Date: 1 December, 2008

This forum was held in Ehime University in commemoration of the starting of the global COE program with a large audience (ca. 300 people). Prof. Oike, the former president of Kyoto University, gave a lecture on the nature of earthquake occurred in and around the Japan Islands. Following the lecture, Prof. Irifune, the program leader, introduced educational and research objectives of the global COE program on deep Earth mineralogy.

The 1st YESA Workshop in Ehime University

(Young Earth Scientist Association of Global COE, YESA/G-COE)

"Studies of subduction zone combined field and experimental works for Earth's interior ~water transportation in the deep mantle and mantle dynamics~"

The 1st YESA Workshop was held at Ehime University, Matsuyama, Japan, from 22-23 January 2009, with about 30 people of young researchers including students. Contributions at the workshop consisted of oral presentations about studies of subduction zone associated with Earth's mantle dynamics from surface to the core. Nowadays, the Earth's internal dynamics is studied by many research fields from experimental, seismological, and simulation methods. The participants brought out and discussed various problems in each field of research, and suggested a new interpretation through this workshop.

Advertised Positions

Openings for Global COE Postdoctoral Fellows and Global COE Research Fellows in Ehime University

Ehime University invites applications from highly-motivated researchers to promote the Global COE program. Each researcher, employed either as Global COE Postdoctoral Fellow or Global COE Research Fellow, will be expected to conduct world-leading experimental or theoretical researches on deep Earth mineralogy with particular emphasis on (i) lower mantle mineralogy, (ii) core materials, and (iii) deep Earth water. Successful applicants are also requested to strongly contribute to the principal research objectives of the Global COE program, beyond their individual research specialty.

Note: The followings introduce the outline of this positions. Detailed information for the applications should be checked in web pages.

http:/www.ehime-u.ac.jp/~grc/

http:/deep-earth-mineralogy.jp/tandem/

1. Positions: Global COE Postdoctoral Fellows and Global COE Research Fellows (hereafter PD Fellow and Res. Fellow, respectively). PD Fellows with excellent research achievements can be promoted to Res. Fellows during the period of their employments.
2. Capacity: About 4-5 PD Fellows and Res. Fellows
3. Research Fields: Advanced experimental and theoretical studies on structure, physical properties, chemical composition, dynamics, and evolution of the Earth and planetary deep interiors.
4. Terms: Term for PD Fellow will end on March 31st, 2010, and can be renewed on a year-by-year basis. Term for Res. Fellow will last three years from their appointments, and can be renewed. Terms cannot be renewed beyond the accomplishment of the COE program (March 2013).
5. Starting Dates: April 1st 2009, or later at the earliest possible dates.
6. Qualifications: Applicants must have a Ph.D. (or equivalent) by the time of employment. Nationality of the applicants will not be considered.
7. Deadline for application: Must arrive by February 13th, 2009.
8. Contact address:

   Tetsuo Irifune (Professor, Leader of Global COE program)
   Geodynamics Research Center, Ehime University
   2-5 Bunkyo-cho, Matsuyama, Ehime, 790-8577 JAPAN.
   e-mail: irifune @ dpc.ehime-u.ac.jp
9. Other support programs: The present Global COE program will offer following training programs for young scientists:
   1) International training at the overseas research institutes,
   2) Travel supports for presenting the research achievements at scientific meetings,
   3) Financial supports for the outstanding research projects by young scientists.

Geodynamics Research Center of Ehime University also offers two positions for assistant professors. The candidates can apply to both of these and the present COE-related positions, but must submit the requested documents separately to each address.

Educational Programs

New special PhD course on deep Earth mineralogy

A special PhD course on deep Earth mineralogy, which will be formed at the Graduate School of Science and Engineering of Ehime University, will annually invite 2 students from Asian countries with exemption of admission and tuition fees. A special support for living expenses (~140,000 yen per month) will also be provided by the University. Application period and selection test date are to be scheduled in May and June, while the enrollment will be late September in each year. The successful applicant should have a Master's degree or is expected to complete it by September.

We invite applications from those who are highly motivated in experimental and computational studies on compositions, structures, physical properties, dynamics, and evolutions of the Earth's and planetary interiors, in addition to those who have strong backgrounds in physics, chemistry, Earth sciences, and materials science. We particularly encourage applications from the TANDEM laboratories. Further details on this special course will officially be announced in March 2009.

For further details, please contact

Prof. Toru Inoue (inoue@sci.ehime-u.ac.jp) of GRC.

Internship Programs

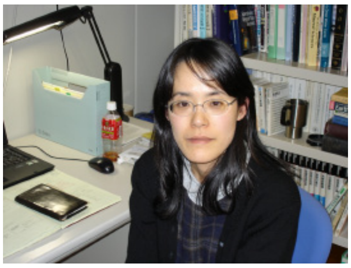
Global COE internships at Geodynamics Research Center, Ehime University, provide opportunities to learn advanced techniques and theories on the earth's deep mineral studies for Ph. D. students and postdoctoral young researchers. Research training on ultra high-pressure and high-temperature experiments and theoretical computations for mineral physics and geodynamics can be offered as the internships.

Contact address for inquiries about the internships:

Geodynamics Research Center, Ehime University
2-5, Bunkyo-cho, Matsuyama, Ehime, 790-8577, JAPAN
Akira Yamada (Research Administrator)
e-mail: yamada@sci.ehime-u.ac.jp

Heterogeneity of water content in Earth's upper mantle: a study of mantle xenoliths

Kyoko N. MATSUKAGE
(Global COE Research Fellow)



My research interests relate to the geochemical effects of fluid (melt) associated with recycling of crustal and mantle materials in interior of our planet. One of resent subjects of my study is the geochemical evolution of the continental mantle. I research the mantle-derived peridotites obtained as xenoliths of alkali basalt from Cameroon volcanic line (CVL), and of kimberlite from Lesotho and Botswana in African craton. These xenoliths give us direct information about the feature and evolution of chemical, petrological and mineralogical variations of the upper mantle beneath volcanoes.

The CVL is a 1,600-km volcanic chain sitting on the continental margin of West Africa. It is well known as the former triple junction, which is made by an upwelling deep mantle plume that controlled the separation of Africa from South America and opening the Atlantic Ocean at ~120 Ma. The CVL is erupting on the failed rift arm of the triple junction. The heterogeneity of texture and chemistry of this area can be explained by process of partial melting and subsequent melt extraction in sallow mantle at depth of 30-80 km. The estimated degree of melting (~30 %) of residual peridotite and the chemical feature of the constituent minerals, that was depleted in incompatible element (SiO_2, Al_2O_3, CaO) with respect to compatible elements (MgO, Cr_2O_3), indicate that the partial melting occurred at almost dry condition. Garnet peridotites from more than 100 km in depth at Lesotho and Botswana areas have quite different with chemistry from that of CVL. The peridotites of these areas characterized the extremely high amount of orthopyroxene (= high amount of SiO_2) with high MgO content. These high-Si and -Mg rocks could not explained as residue of dry partial melting (see Fig. 1), but may be residues of partial melting at H_2O-saturated condition at higher pressure at depth of 200-300 km.

The results suggest that the Earth's mantle is very heterogeneous in water content. The measurement of mineral-liquid/fluid distribution coefficients for elements in major phases is very important to understand the chemical evolution of the Earth's interior. Because the distribution coefficients of mineral-dry melt are expected to be different to that of mineral-wet fluid. My research at the GRC will focus on geochemical effects in both wet and dry conditions, texture of rocks and migration mechanism of fluid and melt at deep Earth.

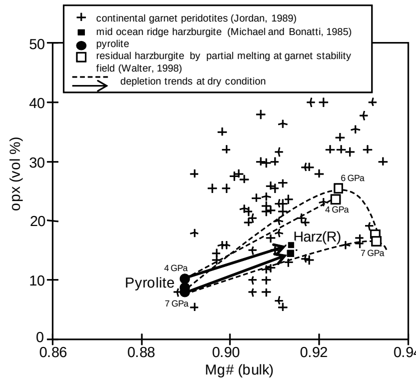


Fig. 1. Relationship between orthopyroxene mode and bulk Mg/(Mg + Fe) atomic ration of peridotites in kimberlite and in CVL (= thick arrows) modified after Matsukage et al. (2005).

High-temperature ultrasonic measurement in multi-anvil apparatus under the melting temperatures of mantle materials

Yoshio KONO
(Global COE Postdoctoral Fellow)

Measurement of the elastic wave velocities of partially or completely molten mantle materials is important to understand the nature and dynamics of the Earth's upper mantle, such as those relevant to subduction volcanism, lithosphere-asthenosphere boundary and/or possible melt layer above the 410 km discontinuity. Some attempts to measure elastic wave velocities of silicate melts have been made at high temperatures and atmospheric pressure (e.g. Ai and Lange, 2008), but the corresponding measurement under the upper mantle pressure conditions has not yet reported to date, because of the limitation in temperature conditions of elastic wave velocity measurement at high pressures (Fig. 1). We therefore need to develop the experimental technique for elastic wave velocity measurement at high-pressures and at temperatures greater than the melting temperatures of mantle materials (higher than 1400 ˚C) to address the above issues. Here I report some preliminary results of ultrasonic measurement at temperatures to 1700 ˚C at high pressures. Graphite was used as the heater instead of platinum used in our previous studies, and zirconia was used as thermal insulator. I also adopted highly sintered zirconia as the buffer rod for transmitting ultrasonic waves to the sample. The ultrasonic measurement shows clear elastic wave signals reflected at both ends of a sample up to 1700 ˚C, which is higher than the melting temperatures of most hydrous silicates and of some anhydrous silicates. Then ultrasonic measurements were carried out for MORB sample to the melting temperature at ~5 GPa. I successfully obtained P-wave signals reflected at both ends of the MORB sample up to 1600 ˚C, but S-wave signals disappeared above ~1400 ˚C, which would be attributed to strong attenuation of S-wave by (partial) melting of MORB. P-wave travel time becomes significantly long above 1400 ˚C due to the melting of MORB. SEM observation of the run product shows that melt was enclosed by BN capsule, but that melt infiltrates into the zirconia buffer rod. Further improvement for enclosing melt should enable us to determined elastic wave velocities of molten mantle materials at simultaneous high-pressures and high-temperatures comparable to the Earth's upper mantle.

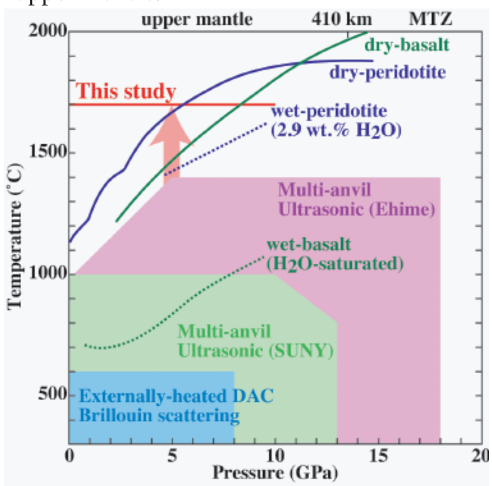
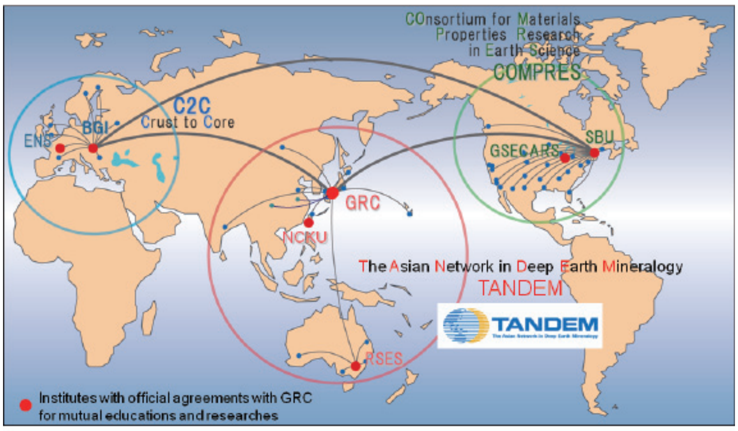


Fig. 1. Pressure and temperature conditions of elastic wave velocity.

TANDEM Outline

TANDEM (The Asian Network in Deep Earth Mineralogy) is an international network in Asia region for the advancement of experimental and computational studies on physical properties, structures, dynamics, and evolution of the Earth's deep interior. TANDEM members combine unique techniques and facilities in individual laboratories to develop new frontiers in deep Earth mineralogy as well as in training young scientists in high-pressure research. TANDEM is coordinated by Geodynamics Research Center (GRC), Ehime University, with financial support by the Global COE program "Center for Advanced Experimental and Theoretical Deep Earth Mineralogy" funded by MEXT, Japan. We will organize the first TANDEM symposium to discuss the future directions of this network and to share the information about the research and education programs in individual laboratories.



TANDEM Laboratories (2009 January)

Ehime University	Japan
University of Tokyo (Geochem. Lab.)	Japan
University of Tokyo (Inst. Solid State Phys.)	Japan
Japan Synchrotron Research Institute	Japan
Hokkaido University	Japan
Kyushu University	Japan
Hiroshima University	Japan
National Institute for Materials Science	Japan
Gakushuin University	Japan
Okayama University	Japan
Tokyo Institute of Technology	Japan
Osaka University	Japan
Kyoto University	Japan
University of Hyogo	Japan
Japan Agency for Marine-Earth Science Technology (IFREE)	Japan
China University of Geosciences	China
Jiling University	China
Peking University	China
Chinese Academy of Science (Inst. Geochem.)	China
Chinese Academy of Science (Inst. Geol. Geophys.)	China
Yanshan University	China
Sichuan University	China
Seoul National University	Korea
National Chen Kung University	Taiwan
Australian National University	Australia

Advisors: Yanbin Wang, GSECARS, Univ. Chicago
Baosheng Li, MPI, Stony Brook Univ.
Juhua Chen, Florida Int. Univ.
Yingwei Fei, Carnegie Inst. Washington

The 1st Global COE Symposium

"Toward formation of The Asian Network in Deep Earth Mineralogy (TANDEM)"

The symposium was held on November 23-25, 2008 in Geodynamics Research Center (Ehime University) for a mutual understanding on the current stage of the deep earth studies conducted in the Asian region. About 100 people (35 from China, Korea, Taiwan, Australia and USA, 60 from Japan) participated in the symposium. In the oral sessions (titles are listed in the next page), representatives of TANDEM member laboratories introduced their laboratories, facilities and new researches. Young scientists showed their own researches in the poster session and made active discussions among the participants. This symposium has been held as the first step to form a new network of deep earth mineralogy in Asian region.

Presentation List of the symposium

Oral Session

T. Irifune: facilities and some recent topics at ultra-high pressure laboratory, GRC

T. Inoue: High Pressure studies for the effect of water on Earth mantle materials

T. Tsuchiya: Ab initio study in geosciences

M. Kameyama: Mantle Convection Simulations at GRC- Tools, Outcrops and Future Prospects -

H. Kagi: Spectroscopic and neutron diffraction studies on deep-earth materials

K. Funakoshi, Y. Higo, Y. Tange: High pressure research using synchrotron radiation and multianvil press at SPring-8

B. Li, R. Liebermann, D. Weidner: Probing the Earth's Interior Using Phonons and Photons at Mantle Pressure and Temperature Conditions

Y. Wang: Synchrotron-based high-pressure research facility at GSECARS, Advanced Photon Source

Z. Jin: High Pressure and Temperature Study at GPMR, China

X. Liu: High pressure laboratory and high pressure experimental research at Peking University

D. Yu, X. Han, Y. Sun, Z. Liu, Y. Tian: Synthesis and Characterization of Calcium Tetraboride Crystal

Y. Zhang, G. Guo: Molecular Dynamics Simulations of Deep Earth Materials

W. Zhou, H. Li, H. Tang, H. Zhang, H. Xie: Laboratory for Study of the Earth's Interior and Geofluids -Present and Future

D. He, L. Lei, J. Qin, C. Chen, F. Wang, Y. Zou: High Pressure Research at Sichuan University

H. Jung & S. Lee: Deformation of rocks in the upper mantle: Probing and Modeling of Pressure-induced Structural Transitions in Amorphous and Crystalline Oxides at High Pressure: Insights from inelastic X-ray scattering & NMR

J. Kung: High pressure research program at NCKU: Current and future

Poster Session

H. Yusa, LHDAC systems for materials science at NIMS

J. Ando, I. Katayama, TANDEM in Hiroshima University

K. Fujino, T. Nagai, H. Miura, D. Hamane, Y. Seto, Recent and future studies of mineralogy group at Hokkaido University

A. Yoneda, D. Yamazaki, T. Yoshino, High-pressure research at ISEI, Okayama University

H. Kojitani, M. Akaogi, Stability of high-pressure materials by thermodynamic approach

N. Nishiyama, T. Irifune, K. Wada, T. Maeda, T. Kawazoe, Developments of high-pressure deformation apparatuses at GRC, Ehime Univ. . MADONNA and Drickamer-cell -

F. Wang, D. He, Two-stage split-sphere high pressure apparatus based on hinge-cage housed Chinese cubic press

T. Kunimoto, T. Irifune, Development of ultra-high pressure generation tec. and performance test with various diamond using a 6-8-2 type multi-anvil apparatus

T. Kawazoe, N. Nishiyama, T. Irifune, Toward melting experiments to 50 GPa and 4000 K using a Kawai apparatus with sintered diamond anvils

L. Deng, Z. Gong, Y. Fei, X. Liu, Direct shock wave loading of $MgSiO_3$ perovskite to lower mantle conditions and its equation of state

Y. Tange, Y. Nishihara, T. Tsuchiya, Unified analyses for P-V-T equation of state of MgO: A solution for pressure-scale problems in high P-T experiments

G. Mallmann, H. O'Neill, F. Jenner, M. Norman, S. Eggins, R. Arcutus, C. Ballhaus, Determining the redox state of basalts and picrites using V/Sc olivine-melt partitioning: experimental calibration and application to natural systems

K. Wada, N. Nishiyama, T. Irifune, T. Nagai, Phase relation of $FeAlO_3$ at high pressure and temperature

S. Greaux, N. Nishiyama, Y. Kono, H. Ohfuji, T. Shinmei, T. Irifune, Phase Equilibrium of Ca- and Al-silicate hosts up to 24 GPa and 2000 K

N. Tsujino, Y. Nishihara, Grain-growth kinetics of ferropericlase at high-pressure

T. Shinmei, T. Irifune, Phase transitions and density changes in pyrolite up to ~ 50 GPa using multianvil apparatus with sintered diamond anvils

Y. Wu, Y. Fei, Z. Jin, X. Liu, The Fate of Subducted Continental Crust: an Experimental Perspective

T. Kawamoto, Fluids in subduction zone 1: significance of elemental partitioning between aqueous fluids and silicate melts

T. Kawasaki, Metamorphic P.T Path of Rundvagshetta, Luzow-Holm Complex, East Antarctica inferred from High-Pressure Experimental and Petrographical Data

N. Doi, T. Kato, T. Kubo, Experimental study on eclogite formation from basaltic oceanic crust

D. Fan, W. Zhou, C. Liu, Y. Liu, Y. Xing, J. Liu, L..Bai, H. Xie, Thermal equation of state of almandine up to 27.7 GPa and 533 K

D. Fan, W. Zhou, C. Liu, Y. Liu, Y. Xing, J. Liu, Y. Li, H. Xie, In situ X-ray diffraction study of natural stibnite at high pressure and high temperature

H. Ishibashi, Non-Newtonian behavior of plagioclase-bearing magma: subliquidus viscosity measurement of Fuji 1707 basalt

S. Odake, S. Fukura, M. Arakawa, A. Ohta, B. Harte, H. Kagi, Micro-XANES measurements of the oxidation state of chromium in natural ferropericlase inclusions

Y. Terada, J. Ando, J. Zhang, H. W. Green, I. Katayama, Deformation Experiment of Antigorite Serpentinite and Microstructures Observation

K. Hirauchi, I. Katayama, Simple shear deformation of low-temperature serpentines

C. Yang, Z Jin, Fabric and water content of olivine in mantle xenoliths from Mingxi and Damaping, eastern China

Y. Nishihara, K. Funakoshi, Y. Higo, H. Terasaki, N. Nishiyama, T. Kubo, A. Shimojuku, N. Tsujino, Stress relaxation test of olivine under Earth's deep upper mantle conditions

R. Farla, I. Jackson, J. F. Gerald, H. Kokkonen, U. Faul, A. barnhoorn, Dislocation Recovery and Damping in Upper Mantle Materials

Y. Wang, J. Zhang, Z. Jin, H. W. Green II, Rheology of mafic granulite at high pressure and temperature: implications for crust-mantle interactions

C. Zhou, Z. Zeng, Strain analysis of the matrix of bone-shaped boudinages from Tieshan, Hubei, China

K. Matsukage, S. Kikuchi, S. Ono, The density and seismic velocities of chromitite body in mantle peridotite

Y. Kono, H. Ohfuji, S. Greaux, T. Inoue, T. Irifune, Y. Higo, Elastic wave velocities of grossular garnet up to 17 GPa and 1650 K

Y. Higo, Y. Kono, T. Inoue, T. Irifune, K. Funakoshi, Elastic wave velocities measurements under the condition of lowermost mantle transition region

M. Kobayakawa, A. Yamada, Thermal structure in the lowermost mantle inferred from short-period P-wave reflections from the D" layer

Y. Usui, M. Kanao, A. Kubo, Y. Hiramatsu, H. Negishi, Anisotropic structure caused by past tectonic events in the upper mantle beneath East Antarctica and Sri Lanka

N. Shibata, A. Yamada, Structures of CMB and ICB regions beneath the Japan Islandsinferred from PcP and PKiKP waves

J. Tsuchiya, T. Tsuchiya, High pressure polymorphism of Al+H-bearing SiO_2: ab initio investigation

Y. Kuwayama, K. Hirose, N. Sata, Y. Ohishi, Phase relations of iron-silicon alloys at high pressure and high temperature

Yi-Jie Lin, Chia-Hui Lin, Chih-ming Lin, T. Yu, Z. Liu, J. Kung, X-ray Diffraction and spectroscopic studies of $CaSnO_3$ perovskite at high pressure

H. Hirai, S. Machida, T. Kawamura, Y. Yamamoto, T. Yagi, Phase changes of methane hydrate under high pressure and their implications for icy planets and satellites

L. Rui, Research on Raman spectra of 1-hexanol at high pressure

H. Ohfuji, K. Aibara, H. Sumiya, T. Irifune, Micro-texture and structure of high-pressure quenched graphite

H. Ohfuji, Laser heating in "nano-polycrystalline" diamond anvil cell - Application for melting experiments of iron

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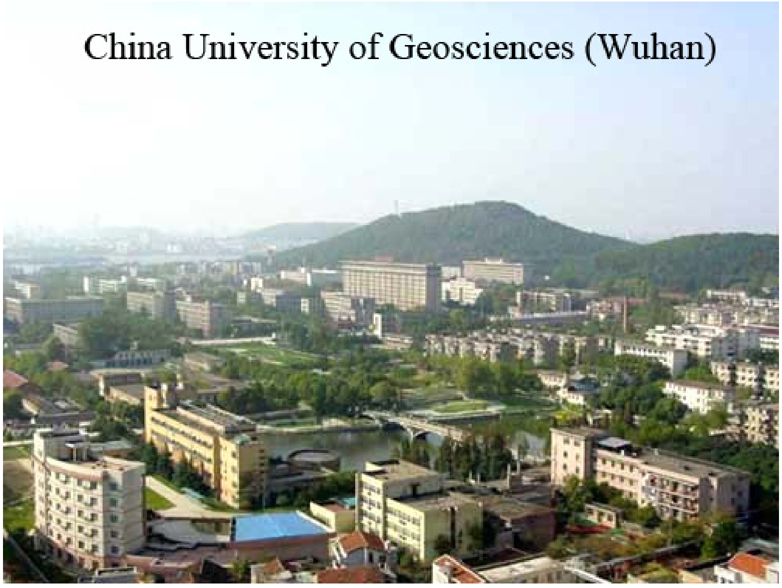
Laboratory for Mineral and Rock Physics in the GPMR, China University of Geosciences at Wuhan



China University of Geosciences is a national key university founded in 1952 in China. It has two campuses: the Wuhan campus and the Beijing campus. It is more than just a university specialized in geosciences. The Wuhan campus has 22 schools of sciences, engineering, literature, economics, law, education and philosophy. It offers 37 Phd programs, 131 Mater degree programs and 62 Bachelor's degree programs. Its faculty consists of ~350 professors and ~580 associate professors, including 9 current members of the Chinese Academy of Sciences. Its current student enrollments are over 44,000.

The State Key Laboratory of Geological Processes and Mineral Resources (GPMR) was established at the China University of Geosciences and sponsored by the Chinese Ministry of Education and the Ministry of Land and Resources. Its original main purpose was to provide a platform for conducting inter-disciplinary geoscience research on the lithosphere evolution and mineralization processes, spatial-temporal distribution of mineral resources, and mineral exploration and mineral resources assessment. Its current research scope has expanded into deep Earth dynamics, environmental protection and geological hazard control. The GPMR consists of five research divisions and led by six members of the Chinese Academy of Sciences. There are 42 full-time professors and researchers in the GPMR.

The laboratory for mineral and rock physics is part of the first division of the GPMR (Division of Composition, Structure and Evolution of the Lithosphere). It is also a relatively new laboratory/research group in the GPMR. Professor Zhenmin Jin is the head of the laboratory for mineral and rock physics. There are currently 7 faculty, 2 postdocs, 3 PhD students and 6 Master students in the group. The laboratory currently houses a 1-atmosphere pressure gas media deformation apparatus and one 5 GPa piston cylinder apparatus. Two new apparatus (a 28GPa Walker's-type multianvil and a 5 GPa Griggs-type deformation apparatus) will join the apparatus family by the end of 2009. In addition to those high P/T apparatus, the GPMR is also equipped with a broad spectrum of analytical instruments (JXA-8100 electron probe, Quanta200 SEM (with an HKL EBSD system), RM1000 Laser Raman, POEMS III ICP-MS, CM12 STEM, Agilent7500a Laser Ablation System, etc). The GPMR provides financial support for short- and long-term external visiting scientists to conduct collaborative research. The laboratory for mineral and rock physics is currently collaborating actively with several international research laboratories in the geosciences field including Prof. Harry Green's laboratory at University of California at Riverside (USA) and Prof. Yingwei Fei's laboratory at Carnegie Institution of Washington (USA). Our research interests are but not limited to the experimental deformation of rocks and minerals at high temperature and pressure, rheology of the crust and mantle, earthquake physics and ultrahigh pressure metamorphism. We look forward to establishing stable and substantial collaborations with any interested individual or institution of the TANDEM on high-pressure geoscience researches and training of young scientists and graduate students.

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