

Department of Analytical Planetary Chemistry

Research Area : Analytical Planetary Chemistry

(URL: <http://pml.misasa.okayama-u.ac.jp/>)

Eizo NAKAMURA, Professor

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Research Themes :

- 》 Heterogeneity of light stable isotopes in the early solar system
- 》 Origin and evolution of meteorites
- 》 Differentiation processes related to the magma ocean in the young earth and planets
- 》 Element partitioning under high PT conditions
- 》 Origin and dynamics of magma
- 》 Evolution of mantle forming materials as a consequence of magma formation
- 》 Hydrothermal alteration processes in the ocean floor environment
- 》 Transportation of elements during the subduction process
- 》 Crust-mantle recycling and geochemical evolution of the upper mantle
- 》 Establishment of new biomedical materials science field
- 》 Astrobiology, bio-environment on the earth

Representative Publication :

- Neavea, D. A., Shorttle, O., Oesera, M., Weyera, S., Kobayashi, K., Mantle-derived trace element variability in olivines and their melt inclusions, *Earth Planet. Sci. Lett.*, 483, 90-104, 2018.
- Bebout, G.E., Banerjee, N.R., Izawa, M.R.M., Kobayashi, K., Lazzeri, K., Nakamura, E., Nitrogen Concentrations and Isotopic Compositions of Seafloor-Altered Terrestrial Basaltic Glass: Implications for Astrobiology, *Astrobiology*, 18, 2017.
- Feyissa, D. H., Shinjo, R., Kitagawa, H., Meshesha, D. Nakamura, E., Petrologic and geochemical characterisation of rift-related magmatism at the northernmost Main Ethiopian Rift: Implications for plume-lithosphere interaction and the evolution of rift mantle sources, *Lithos*, 282-283, 240-261, 2017.
- Makishima, A., Origins of the Earth, moon and life: An interdisciplinary approach, Elsevier, Amsterdam, Netherlands, pp.255, 2017. ISBN: 978-0-12-812058-3
- Tanaka, R., Nakamura, E., Silicate-SiO reaction in a protoplanetary disk recorded by oxygen isotopes in chondrules, *Nature Astronomy*, 1, 0137, 2017.
- Tanaka, R., Yokoyama, T., Kitagawa, H., Tesfaye, D.B., Nakamura, E., Evaluation of the applicability of acid leaching for the ^{238}U - ^{230}Th internal isochron method, *Chem. Geol.*, 396, 255-264, 2015.
- Schiavi, F., Rosciglione, A., Kitagawa, H., Kobayashi, K., Nakamura, E., Nuccio, M.P., Ottolini, L., Paonita, A., Vannucci, R., Geochemical heterogeneities in magma beneath Mount Etna recorded by 2001006 melt inclusions, *Geochem. Geophys. Geosyst.*, doi:10.1002/2015GC005786, 2015.
- Pineda-Velasco, I., Nguyen, T., T., Kitagawa, H., Nakamura, E., Comment on "Diverse magmatic effects of subducting a hot slab in SW Japan: Results from forward modeling" by J. Kimura et al., *Geochem. Geophys. Geosyst.*, 16, 2015.

Department of Experimental Planetary Physics

Research Area : Experimental Planetary Physics

(URL: <http://www.misasa.okayama-u.ac.jp/~masami/>, <http://www.misasa.okayama-u.ac.jp/~xianyu/>,
<http://www.misasa.okayama-u.ac.jp/~epml/okuchi/>, <http://www.misasa.okayama-u.ac.jp/~hacto/>,
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Daisuke YAMAZAKI, Associate Professor

Shigeru YAMASHITA, Associate Professor

Takashi YOSHINO, Associate Professor

Akira YONEDA, Associate Professor

Matthew IZAWA, Assistant Professor

Research Themes :

- 》 Development of high-pressure high-temperature generation techniques and application to planetary interiors
- 》 Development of synthesis technique for large single crystals of the Earth's mantle
- 》 Determination of physical properties (elasticity, plasticity and transport properties) of minerals under high-pressure and -temperature
- 》 Local structures of minerals and magmas (glasses) by spectroscopic techniques (NMR, Raman, IR, etc.)
- 》 Crystal structure determination of new high-pressure phases by diffraction techniques
- 》 Solution mechanisms for volatile species in magmatic melts and nominally anhydrous minerals
- 》 In-situ observation and analysis of synthetic samples under conditions of planetary surface and interior

Representative Publication :

- Kanzaki, M., Xue, X., Wu, Y. and Nie, S. (2017) Crystal structures of two oxygen-deficient perovskite phases in the $\text{CaSiO}_3\text{-CaAlO}_{2.5}$ join, *Physics and Chemistry of Minerals*, 44, 717-733.
- Casati, N., Kleepe, A., Jephcoat, A.P., and Macchi, P. (2016) Putting pressure on aromaticity along with in situ experimental electron density of a molecular crystal, *Nature Communication*, 7, 10901.
- Xue, X., Kanzaki, M., Turner, D. and Lorch, D. (2017) Hydrogen incorporation mechanisms in forsterite: New insights from ^1H and ^{29}Si NMR spectroscopy and first-principles calculation, *American Mineralogist*, 102, 519-536.
- Tomioka, N. and Okuchi, T. (2017) A new high-pressure form of Mg_2SiO_4 highlighting diffusionless phase transitions of olivine, *Scientific Reports*, 7, 17351.
- Yamazaki, D., Tsujino, N., Yoneda, A., Ito, E., Yoshino, T., Tange, Y. and Higo, Y. (2017) Grain growth of ϵ -iron: Implications to grain size and its evolution in the Earth's inner core, *Earth and Planetary Science Letters*, 459, 238-243.
- Chertkova, N. and Yamashita, S. (2015) In situ spectroscopic study of water speciation in the depolymerized $\text{Na}_2\text{Si}_2\text{O}_5$ melt, *Chemical Geology*, 409, 149-156.
- Yoshino, T., Zhang, B., Rhymer, B., Zhao, C. and Fei, H. (2017) Pressure dependence of electrical conductivity in forsterite, *Journal of Geophysical Research*, 122, 158-171.
- Yoneda, A., Fukui, H., Gomi, H., Kamada, S., Xie, L., Hirao, N., Uchiyama, H., Tsutsui, S. and Baron, A.Q.R. (2017) Single crystal elasticity of gold up to ~ 20 GPa: Bulk modulus anomaly and implication for a primary pressure scale, *Japan Journal of Applied Physics*, 56, 095801.
- Izawa, M.R.M., Cloutis, E.A., Rhind, T., Mertzman, S.A., Poitras, J., Applin, D.M. and Mann, P. (2017) Spectral reflectance (0.35-2.5 μm) properties of garnets: Implications for remote sensing detection and characterization, *Icarus*, 300, 392-410.