

Curriculum Vitae

Huijeong Hwang

Assistant professor

Department of Environment and Energy Engineering

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EDUCATION

Mar. 2014 ~ Feb. 2020 Ph.D. of Geosciences, Yonsei University
Advisor: Prof. Yongjae Lee
Thesis: Pressure- and heat-induced water insertion into kaolin-group Minerals

Mar. 2009 ~ Feb. 2014 Bachelor of Earth System Sciences, College of Science, Yonsei University

EXPERIENCE

Feb. 2022 ~ Present Assistant professor, Gwangju Institute of Science and Technology (GIST)

Mar. 2021 ~ Dec. 2021 Postdoctoral Researcher, Deutsches Elektronen-Synchrotron (DESY)
(Alexander von Humboldt Research Fellowship)

Mar. 2020 ~ Feb. 2021 Postdoctoral Researcher, Department of Earth System Sciences,
Yonsei University

RESEARCH INTEREST

- ✓ Pressure- and heat-induced phase transition of layered materials
- ✓ Pressure and temperature-induced phase transition and ion exchange properties of zeolite mineral
- ✓ Industrial applications of minerals, such as mineral carbonation and nuclear waste disposal
- ✓ Synchrotron analysis for material science (X-ray diffraction, Spectroscopy, Imaging)
- ✓ Development of high-pressure and temperature apparatus
- ✓ Time-resolved dynamic compression experiment of metal using X-ray diffraction

PUBLICATIONS (SCI ONLY, BOLD: 1ST AUTHOR)

[33] D. Kraus, J. Rips, M. Schörner, ... , **H. Hwang**, ... , E. Brambrink, K. Appel, M. I. McMahon “The structure of liquid carbon elucidated by in situ X-ray diffraction” *Nature* **642**, 351-355 (2025)

[32] J. S. Wark, D. J. Peake, T. Stevens, ... , **H. Hwang**, ... , E. Brambrink, K. Appel, M. I. McMahon “Femtosecond temperature measurements of laser-shocked copper deduced from the intensity of the x-ray thermal diffuse scattering” *Journal of Applied Physics* **137**, 155904 (2025)

[31] H. Min, Y. J. Ji, H. W. Choi, Y. Ju, **H. Hwang**, J.-H. Yoon, C. G. Yoo, Y. J. Kim, S. B. Kang “Superior Catalytic Activity for Dry Reforming of Methane: Ni-incorporated in Silica Supports by Framework Ligands” *Journal of Cleaner Production* **501**, 145269 (2025)

- [30] S. Lee, H. Lee, H. Hwang, D. Seoung, H. Kim, P. Kim, Y. Lee “Relationship between Electronegativity of the Extra-Framework Cations and Adsorption Capacity for CO₂ Gas on Mordenite framework” *Inorganic Chemistry* **64**(2), 903-910 (2025)
- [29] J. Park, H. Hwang, H. An, K. Yang “High-Resolution Reconstruction of Oxidation-Reduction Condition: Raman Spectroscopy and μ -XRF Analysis of Manganese Nodules and Crust on the Tabletop of Western Pacific Magellan Seamounts” *Minerals* **14**(11), 1135 (2024)
- [28] H. An, J. Jung, H. Hwang, S. Kim, J. Kim, Y. Ko and K. Yang “Uncovering the oxic-suboxic microenvironment change in seamount flank through authigenic clay minerals in basaltic substrate of ferromanganese crust, Magellan seamount” *Frontiers in Marine Science* **11**, 1481396 (2024)
- [27] R. Husband, H.-P. Liermann, J. McHardy, ... , H. Hwang, ..., J. S.-Dambietz, U. Zastrau, M. McMahon “Phase transition kinetics of superionic H₂O ice phases revealed by Megahertz X-ray free-electron laser-heating experiments” *Nature Communications* **15**, 8256 (2024)
- [26] O. B. Ball, R. J. Husband, J. D. McHardy, ... , H. Hwang, ..., Zs. Jenei, H.-P. Liermann, R. S. McWilliams “Measurement bias in self-heating x-ray free electron laser experiments from diffraction studies of phase transformation in titanium” *Journal of Applied Physics* **136**, 115902 (2024)
- [25] Y. Bang, H. Hwang, H.-P. Liermann, D. Y. Kim, Y. He, T.-Y. Jeon, T. J. Shin, D. Zhang, D. Popov, Y. Lee “A role for subducting clays in the water transportation into the Earth’s lower mantle” *Nature Communications* **15**, 4428 (2024)
- [24] M. G. Gorman, D. McGonegle, R. F. Smith, ... , H. Hwang, ... , E. Brambrink, K. Appel, M. I. McMahon “Shock compression experiments using the DiPOLE 100-X laser on the high energy density instrument at the European x-ray free electron laser: Quantitative structural analysis of liquid Sn” *Journal of Applied Physics* **135**, 165902 (2024)
- [23] M. Frost, R. S. McWilliams, E. Bykova, ... , H. Hwang, ... , Z. Wu, S. H. Glenzer, A. F. Goncharov “Diamond Precipitation Dynamics from Hydrocarbons at Icy Planet Interior Conditions” *Nature Astronomy* **8**, 174-181 (2024)
- [22] J. Choi, R. J. Husband, H. Hwang, ... , B. Chae, H.-P. Liermann, Y. Lee “Oxidation of iron by giant impact and its implication on the formation of reduced atmosphere in the early Earth” *Science Advances* **9**(50) eadi6096 (2023)
- [21] N. Jaisle, D. Cébron, Z. Konôpková, ... , H. J. Hwang, ... , M. Mezouar, G. Garbarino, G. Morard “MHz free electron laser x-ray diffraction and modeling of pulsed laser heated diamond anvil cell” *Journal of Applied Physics* **134**, 095904 (2023)
- [20] O. B. Ball, C. Prescher, K. Appel, ... , H. Hwang, ... , U. Zastrau, R. S. McWilliams, Z. Konôpková “Dynamic optical spectroscopy and pyrometry of static targets under optical and x-ray laser heating at the European XFEL” *Journal of Applied Physics* **134**(5) 055901 (2023)
- [19] H. Hwang, Y. Bang, J. Choi, H. Cynn, Z. Jenei, W. J. Evans, A. Ehnes, I. Schwark, K. Glazyrin, G. D. Gatta, P. Lotti, C. Sanloup, Y. Lee, H.-P. Liermann “Graphite resistive heated diamond anvil cell for simultaneous high-pressure and high-temperature diffraction experiments” *Review of Scientific Instruments* **94**, 083903 (2023)
- [18] R. J. Husband, C. Strohm, K. Appel, ... , H. Hwang, ... , U. Zastrau, Z. Jenei, H.-P. Liermann “A MHz X-ray diffraction set-up for dynamic compression experiments in the diamond anvil cell” *Journal of Synchrotron Radiation* **30** (2023)
- [17] H. Hwang, H. Lee, S. Lee, J. Jung, Y. Lee “Changes in the Linear Compressibility and Bulk Modulus of Natural Stilbite Under Pressure with Varying Pressure-Transmitting Media (천연 스틸바이트의 압력전달매개체에 따른 선형압축률 및 체적탄성률 비교 연구)” *Korean Journal of Mineralogy and Petrology* (광물과 암석), **35**(3), 367-376 (2022)

- [16] W. Choi, J. Choi, H. Hwang, Y. Lee “Transformation of natural pollucite into hexacelsian under high pressure and temperature” *Physics and Chemistry of Minerals* **49**, 15 (2022)
- [15] S. Yun, H. Hwang, G. Hwang, Y. Kim, D. Blom, T. Vogt, J. E. Post, T.-Y. Jeon, T. J. Shin, D.-Z. Zhang, H. Kagi, Y. Lee “Super-hydration and reduction of manganese oxide minerals at shallow terrestrial depths” *Nature Communications* **13**, 1942 (2022)
- [14] R. Husband, R. S. McWilliams, E. Pace, A. Coleman, H. Hwang, J. Choi, T. Kim, G. C. Hwang, O. Ball, S. H. Chun, D. Nam, S. Kim, H. Cynn, V. Prakapenka, S.-H. Shim, S. Toleikis, M. McMahon, Y. Lee, H.-P. Liermann “X-ray Free Electron Laser Heating of Water and Gold at High Static Pressure” *Communications Materials* **2**, 61 (2021)
- [13] H. P. Liermann*, Z. Konopkova, ... , H. Hwang, ..., U. Zastrau and C. Strohm "Novel experimental setup for MHz X-ray diffraction in the Diamond Anvil Cell at the High Energy Density (HED) Instrument of the European X-ray Free Electron Laser (EuXFEL)" *Journal of Synchrotron Radiation* **28**(3), 688-706 (2021)
- [12] H. Hwang et al. “X-ray Free Electron Laser-Induced Synthesis of ϵ -Iron Nitride at High Pressures” *Journal of Physical Chemistry Letters* **12**(12), 3246-3252 (2021) *Cover article (2021.04)
- [11] Y. Bang, H. Hwang, T. Kim, H. Cynn, Y. Park, H. Jung, C. Park, D. Popov, V. B. Prakapenka, L. Wang, H.-P. Liermann, T. Irifune, H.-K. Mao, Y. Lee* “The stability of subducted glaucophane with the Earth’s secular cooling” *Nature Communications* **12**, 1496 (2021)
- [10] G. C. Hwang $\pm$, H. Hwang $\pm$, Y. Bang $\pm$, J. Choi, Y. Park, T.-Y. Jeon, B. Chae, H. Jung, Y. Lee* “A role for subducted albite in the water cycle and alkalinity of subduction fluids” *Nature Communications* **12**, 1155 (2021) $\pm$: These authors contributed equally to this work
- [09] H. Hwang et al. “Sub-nanosecond phase transition dynamics in laser-shocked iron” *Science Advances* **6**(23), eaaz5132 (2020)
- [08] E. J. Pace, A. L. Coleman, R. J. Husband, H. Hwang, J. Choi, T. Kim, G. Hwang, S. H. Chun, D. Nam, S. Kim, O. B. Ball, H.-P. Liermann, M. I. McMahon, Y. Lee, R. S. McWilliams “Intense Reaction in Sulfur-Hydrogen Mixtures at High Pressure under X-ray Irradiation” *Journal of Physical Chemistry Letters* **11**(5), 1828-1834 (2020)
- [07] H. Hwang, J. Choi, Z. Liu, D. Y. Kim, Y. He, A. J. Celestian, T. Vogt, Y. Lee “Pressure-induced hydration and formation of bi-layer ice in nacrite, a kaolin-group clay” *ACS Earth and Space Chemistry* **4**(2), 183-188, 2020. 02 *Cover article (2020)
- [06] S. Kwon, H. Hwang, Y. Lee “Effect of Pressure Treatment on the Specific Surface Area in Kaolin Group Minerals” *Crystals* **9** (10), 528 (2019)
- [05] H. Hwang, D. Seoung, Y. Lee, Z. Liu, H.-P. Liermann, H. Cynn, T. Vogt, C.-C. Kao, H.-K. Mao “A role for subducted super-hydrated kaolinite in Earth’s deep water cycle” *Nature Geoscience* **10**, 947-953 (2017)
- [04] R. Miletich, H. Hwang, Y. Lee, G. D. Gatta, T. Pippinger 'Dynamic compression and time-resolved XRD across the phase boundaries of the high-P polymorphs of CaCO_3 ' *Acta Crystallographica Section A* **71**, s358 (2015) doi:10.1107/s2053273315094644
- [03] T. Okuchi, N. Purevjav, N. Tomioka, J. Lin, T. Kuribayashi, L. Schoneveld, H. Hwang, N. Sakamoto, N. Kawasaki, H. Yurimoto, “Synthesis of large and homogeneous single crystals of water-bearing minerals by slow cooling at deep-mantle pressures” *American Mineralogist* **100**(7), 1483-1492 (2015)
- [02] H. Hwang, D. Seoung, G. D. Gatta, D. A. Blom, T. Vogt, Y. Lee, “Topotactic and reconstructive changes at high pressures and temperatures from Cs-natrolite to Cs-hexacelsian” *American Mineralogist* **100**(7), 1562-1567 (2015)
- [01] Y. Lee, Y. Lee, D. Seoung, J.-H. Im, H. J. Hwang, T.H. Kim, D. Liu, Z. Liu, S.Y. Lee, C.-C. Kao, T. Vogt,

“Immobilization of Large, Aliovalent Cations in the Small-Pore Zeolite K-Natrolite by Means of Pressure” *Angewandte Chemie-International Edition* 51(20), 4848-4851 (2012)

PRESENTATION AT CONFERENCE & WORKSHOP

Invited talk: “Development of graphite resistive heating DAC for studying water transport in subduction zones at P02.2 Extreme Conditions Beamline at PETRA III” DESY CMWS DAYS 2021 workshop, Germany, Mar. 24, 2021

Invited talk: “XFEL-induced synthesis of epsilon-iron nitride at high pressures” European XFEL Users’ Meeting, Germany, Jan. 20, 2021

Invited talk: “Dynamic compression at Pohang X-ray Free Electron Laser Facility (PAL-XFEL)” The conference of the Asian Crystallographic Association 2018 (AsCA 2018), New Zealand, Dec. 02, 2018.

“Water insertion in kaolinite under moderate pressure and temperature”, 2016 IUCr High-Pressure Workshop, Korea, Sep. 20, 2016. Poster

“Formation of strontianite and otavite via extra-framework cation-exchange in natrolite at hydrothermal conditions”, 2015 Fall Joint Conference of Geological Science of Korea, Korea, Oct. 28, 2015. Poster

“Dynamic compression and time-resolved XRD across the phase boundaries of the high-P polymorphs of CaCO₃” R Miletich, H Hwang, Y Lee, D Gatta, T Pippinger, 29th European Crystallographic Meeting, Acta Cryst A. A71, s358, 2015.08.23-28, doi: 10.1107/S2053273315094644

RESEARCH EXPERIENCES

Research Intern at *Institute for Planetary Materials, Okayama University, Japan*

Jul. 2012 ~ Aug. 2012

✓ Misasa International Student Internship Program 2012

Advisor: Prof. Takuo Okuchi, Prof. Naotaka Tomioka

Visiting researcher at *Center for High Pressure Science & Technology Advanced Research, China*

Mar. 2017 ~ Aug. 2017

Visiting researcher at *PETRA III, DESY, Germany*

Mar. 2019 ~ Oct. 2019

AWARDS AND HONORS

2021	Alexander von Humboldt research fellowship (Mar. 2021 - Feb. 2023), ~ 42,000 € /yr Grant
2020	18th New Scientist Academic Award, The 32th Synchrotron Radiation User's Workshop and KOSUA meeting
2019	The Graduate School of YONSEI University Research Scholarship Grants
2017	Chung Sung-Kee Research Award, College of Science, Yonsei University
2016	Poster Session Award, 2016 IUCr High-Pressure Workshop
2014	Poster Session Award, The 26 th Synchrotron Radiation User's Workshop and KOSUA meeting