Taehyun Kim (T. Kim) - Curriculum Vitae

(Updated on Dec-14-2024)

Affiliation : School of Earth and Space Exploration, Arizona State University

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Educations

2017. 05. – 2022. 02., Visiting graduate student, School of Earth and Space Exploration, Arizona State University, Tempe, USA.

2015. 09. – 2022. 02., **Ph.D.** in Geological science. Department of Earth System Sciences, Yonsei University, Seoul, South Korea.

2010. 03. – 2015. 08., **Bachelor of Science**, Department of Earth System Sciences, Yonsei University, Seoul, South Korea.

Academic Appointments

2022. 05. – present, Postdoctoral research scholar, School of Earth and Space Exploration, Arizona State University, Tempe, USA.

2022. 03. – 2022. 04., Postdoctoral researcher, Department of Earth System Sciences, Yonsei University, Seoul, South Korea.

Scientific / Technical Expertise

- **High pressure** : I conducted research using diamond-anvil cells (DAC) at Arizona State University (ASU), Yonsei University, synchrotron facilities (APS, ALS, DESY, SSRL PLS II, and PAL-XFEL). I conducted research using a large-volume press (LVP) instrument at ASU.
- **High temperature** : I conducted research using laser heating systems at ASU, APS, and DESY. I built a new laser heating system at Yonsei University. I have conducted research using a resistive heating system at DESY. I have conducted pulsed-laser shock experiments at PAL-XFEL.
- **Synchrotron X-ray diffraction** : I conducted the synchrotron X-ray diffraction (XRD) experiments at Advanced Photon Source (APS; USA), Advanced Light Source (ALS; USA), Deutsches Elektronen-Synchrotron (DESY; Germany), Stanford Synchrotron Radiation Light Source (SSRL; USA), Pohang Ligh Source-II (PLS II; South Korea), and Pohang Accelerator Laboratory X-ray Free Electron Laser (PAL-XFEL; South Korea).
- **Synchrotron infrared spectroscopy** : I conducted the synchrotron infrared spectroscopy experiments at National Synchrotron Light Source II (NSLS II; USA), and PLS II.
- **Raman spectroscopy** : For samples in laser-heated DAC, I conducted research using the Raman

spectroscopic systems at ASU, and APS.

- **Electron microscopy** : For chemical analysis, I conducted research using focused-ion beam instrument combined with scanning electron microscope at ASU and Yonsei University. I have also conducted research using transmission electron microscope instruments at ASU and Yonsei University.
- **High-pressure gas-loading** : I conducted research using the high-pressure gas-loading systems at ASU, APS, and DESY. I used H_2, Argon-H_2 mixture, and Argon gases for DAC experiments.
- Synchrotron X-ray fluorescence : I conducted the synchrotron X-ray fluorescence (XRF) experiments at SSRL.
- Synchrotron X-ray tomography : I conducted the synchrotron X-ray tomography at PLS II.
- Neutron diffraction and tomography : I conducted the neutron diffraction and tomography at Australian Nuclear Science and Technology Organisation (ANSTO, Australia).

Research Interests

Mineral Physics

- Planetary materials at high-pressure and high-temperature conditions
- Melting of planetary materials (e.g., peridotite)
- Chemical properties (e.g., partition coefficient) of volatile elements between molten silicates and liquid metals at high pressure
- Chemical interactions between silicates/metals and volatile materials (e.g., H_2)
- Studying under-explored phase diagrams that include volatile materials (e.g., silicates-H_2O, silicates-H_2, and H_2-H_2O) at high-pressure and high-temperature conditions
- Understanding the elastic properties of hydrous minerals
- Synthesizing new hydrides and hydrous materials

Geophysics

- The cycle of planetary materials in the Earth's deep interior
- Understanding processes at core-mantle boundary conditions
- Linking mineral physics research with seismic observations / geodynamic simulations

Planetary Sciences

- Understanding the early stages of planetary evolution (e.g., magma ocean)
- The deep interiors of ice giants and sub-Neptunes
- Linking mineral physics research with astrophysical observations

Academic Performance

In revision / In review / In preparation

- **Taehyun Kim***, Stella Chariton, Vitali Prakapenka, Sergio Speziale, and Sang-Heon Shim* (*in preparation; to be submitted next year*). Chemical reactions between (Mg,Fe)O and H_2O at multi-megabar conditions: its implications on the deep interior of large water-rich planets.
- **Taehyun Kim***, Stella Chariton, Vitali Prakapenka, Young-Jay Ryu, Shize Yang, and Sang-Heon Shim* (*in preparation; to be submitted early next year*). Effect of H_2-to-H_2O ratio on the stability of silicates in sub-Neptune exoplanets.
- **Taehyun Kim***, Stella Chariton, Eran Greenberg, Vitali Prakapenka, Yongjae Lee, Sang-Heon Shim* (*in preparation; to be submitted this year*). The effect of water on the post-perovskite transition pressure and its thickness.
- **Taehyun Kim**, Sang-Heon Shim*, Mingming Li, Edward Garnero, Eran Greenberg, Stella Chariton, Vitali Prakapenka, and Yongjae Lee* (*in review at **Nature Geoscience***). Hydrous melting at the Earth's core-mantle boundary as the origin of ultra-low velocity zones.
- Jeongmin Lee, Jaeyoon Keum, **Taehyun Kim**, Stella Chariton, Vitali Prakapenka, Nico Giordano, Byung-Dal So, Huijeong Hwang, and Yongjae Lee* (*in revision*). Thermal evolution of the sulfur-rich, small terrestrial planetary core as inferred from the experimental study of the Fe-S-O-H system.

Peer-reviewed articles <My role and/or keywords are below of each publication>

- **Taehyun Kim***, Xuehui Wei, Stella Chariton, Vitali Prakapenka, Young-Jay Ryu, Shize Yang, and Sang-Heon Shim*. Stability of hydrides in sub-Neptune exoplanets with thick hydrogen-rich atmospheres. ***Proc. Natl. Acad. Sci. U.S.A.*** 120 (52), December 2023. (10.1073/pnas.2309786120)

  <I led the research project. Keywords: Sub-Neptunes, Exoplanets, Magma-H_2 interaction>

- Jinhyuk Choi, Rachel J. Husband, Huijeong Hwang, **Taehyun Kim**, Yoonah Bang, Seohee Yun, Jeongmin Lee, Heehyeon Sim, Sangsoo Kim, Daewoong Nam, Boknam Chae, Hanns-Peter Liermann, Yongjae Lee*. Oxidation of iron by giant impact and its implication on the formation of reduced atmosphere in the early Earth. ***Science Advances*** 9, December 2023. (10.1126/sciadv.adi6096)

  <I performed laser-shock and laser-heated DAC experiments>

- **Taehyun Kim**, Joseph G. O'Rourke, Jeongmin Lee, Stella Chariton, Vitali Prakapenka, Rachel J. Husband, Nico Giordano, Hanns-Peter Liermann, Sang-Heon Shim*, Yongjae Lee*. A hydrogen-enriched layer in the topmost outer core sourced from deeply subducted water. ***Nature Geoscience*** 16, November 2023. (10.1038/s41561-023-01324-x)

  <I led the research project. Keywords: Core-mantle boundary, Outermost core, E′ layer>

- **Taehyun Kim**, Stella Chariton, Vitali Prakapenka, Anna Pakhomova, Hanns-Peter Liermann, Zhenxian Liu, Sergio Speziale, Sang-Heon Shim*, and Yongjae Lee*. Atomic-scale mixing between MgO and H_2O in the deep interiors of water-rich planets. ***Nature Astronomy*** 5, August 2021. (10.1038/s41550-021-01368-2)

  <The article was highlighted by *Nature Astronomy*; 10.1038/s41550-021-01421-0. I led the research

project. Keywords: Water-rich exoplanets, MgO dissolution, Ice giants>

- R. J. Husband*, R. S. McWilliams, E. J. Pace, A. L. Coleman, H. Hwang, J. Choi, **T. Kim**, G. C. Hwang, O. B. Ball, S. H. Chun, D. Nam, S. Kim, H. Cynn, V. B. Prakapenka, S.-H. Shim, S. Toleikis, M. I. McMahon, Y. Lee, and H.-P. Liermann. X-ray free electron laser heating of water and gold at high static pressure. ***Communications Materials*** 2, June 2021. (10.1038/s43246-021-00158-7)

  <I measured XRD data during PAL-XFEL beamtime>

- H. Hwang, **T. Kim**, H. Cynn, T. Vogt, R. J. Husband, K. Appel, C. Baehtz, O. B. Ball, M. A. Baron, R. Briggs, M. Bykov, E. Bykova, V. Cerantola, J. Chantel, A. L. Coleman, D. Dattlebaum, L. E. Dresselhaus-Marais, J. H. Eggert, L. Ehm, W. J. Evans, G. Fiquet, M. Frost, K. Glazyrin, A. F. Goncharov, Z. Jenei, J. Kim, Z. Konôpková, J. Mainberger, M. Makita, H. Marquardt, E. E. McBride, J. D. McHardy, S. Merkel, G. Morard, E. F. O'Bannon, III, C. Otzen, E. J. Pace, A. Pelka, C. M. Pépin, J. S. Pigott, V. B. Prakapenka, C. Prescher, R. Redmer, S. Speziale, G. Spiekermann, C. Strohm, B. T. Sturtevant, N. Velisavljevic, M. Wilke, C.-S. Yoo, U. Zastrau, H.-P. Liermann, M. I. McMahon, R. S. McWilliams*, and Y. Lee*. X-ray free electron laser-induced synthesis of ε-iron nitride at high pressures. ***The Journal of Physical Chemistry Letters*** 12, March 2021. (10.1021/acs.jpclett.1c00150)

  <I performed transmission electron microscopy measurements for the recovered samples>

- Yoonah Bang, Huijeong Hwang, **Taehyun Kim**, Hyunchae Cynn, Yong Park, Haemyeong Jung, Changyong Park, Dmitry Popov, Vitali B. Prakapenka, Lin Wang, Hanns-Peter Liermann, Tetsuo Irifune, Ho-Kwang Mao, and Yongjae Lee*. The stability of subducted glaucophane with the Earth's secular cooling. ***Nature Communications*** 12, March 2021. (10.1038/s41467-021-21746-8)

  <I performed laser-heated DAC experiments for the project>

- Huawei Chen*, Sheng-Yi Xie, Byeongkwan Ko, **Taehyun Kim**, Carole Nisr, Vitali Prakapenka, Eran Greenberg, Dongzhou Zhang, Wenli Bi, Alp E. Ercan, Yongjae Lee, and Sang-Heon Shim*. A new hydrous iron oxide phase stable at mid-mantle pressures. ***Earth and Planetary Science Letters*** 550, November 2020. (10.1016/j.epsl.2020.116551)

  <I collected some XRD data for the project>

- **Taehyun Kim**, Byeongkwan Ko, Eran Greenberg, Vitali Prakapenka, Sang-Heon Shim*, and Yongjae Lee*. Low melting temperature of anhydrous mantle materials at the core-mantle boundary. ***Geophysical Research Letters*** 47, October 2020. (10.1029/2020GL089345)

  <I led the research project. Keywords: Melting, Pyrolite, Lower mantle>

- H. Hwang, E. Galtier, H. Cynn, I. Eom, S. H. Chun, Y. Bang, G. C. Hwang, J. Choi, **T. Kim**, M. Kong, S. Kwon, K. Kang, H. J. Lee, C. Park, J. I. Lee, Y. Lee, W. Yang, S.-H. Shim, T. Vogt, S. Kim, J. Park, S. Kim, D. Nam, J. H. Lee, H. Hyun, M. Kim, T.-Y. Koo, C.-C. Kao, T. Sekine, and Y. Lee*. Subnanosecond phase transition dynamics in laser-shocked iron. ***Science Advances*** 6, June 2020. (10.1126/sciadv.aaz5132)

  <I prepared samples and measured XRD data for the project>

- 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, and R. S. McWilliams*. Intense reactivity in sulfur−hydrogen mixtures at high pressure under x‐ray irradiation. ***The Journal of Physical Chemistry Letters*** 11, February 2020. (10.1021/acs.jpclett.9b03797)

<I performed a few XRD experiments for the project>

- Xin Li, Ye Yuan, Jinbo Zhang, **Taehyun Kim**, Dongzhou Zhang, Ke Yang, Yongjae Lee, and Lin Wang*. Pressure-induced photoluminescence of MgO. ***Journal of Physics: Condensed Matter*** 30, May 2018. (10.1088/1361-648X/aabb40)

  <I performed some chemical analysis for the project>

- **Taehyun Kim**, Yongjae Lee*, and Yuong-Nam Lee. Fluorapatite diagenetic differences between Cretaceous skeletal fossils of Mongolia and Korea. ***Palaeogeography, Palaeoclimatology, Palaeoecology*** 490, January 2018. (10.1016/j.palaeo.2017.11.047)

  <I performed XRD, XRF, and X-ray CT for fossils excavated at South Korea and Mongolia. Keywords: Mineralogical identification, Color of fossils>

- Yongjae Lee*, Yongmoon Lee, Donghoon Seoung, Jun-Hyuk Im, Hee-Jung Hwang, **Tae-Hyun Kim**, Dan Liu, Zhenxian Liu, Seung Yeop Lee, Chi-Chang Kao, and Thomas Vogt. Immobilization of large, aliovalent cations in the small-pore zeolite k-natrolite by means of pressure. ***Angewandte Chemie International Edition*** 51, 2012. (10.1002/anie.201201045)

  <I synthesized some samples>

Invited Presentations

- October 2024. Colloquium Guest Speaker. **The Department of Geosciences at Stony Brook University**, USA. Title: Chemical reactions between silicates and volatile materials at high pressures and temperatures: implications for exoplanets.
- March 2024. Guest Speaker. **The Atmospheric Physics of Exoplanets Department at the Max Planck Institute for Astronomy**, Germany. Title: Stability of hydrides in sub-Neptune exoplanets with thick hydrogen-rich atmospheres.

Conference Abstracts (invited[#])

- **Taehyun Kim**, Sang-Heon Shim, Mingming Li, Edward Garnero, Eran Greenberg, Stella Chariton, Vitali Prakapenka, Shize Yang, and Yongjae Lee. Understanding the ultralow velocity zones at the Earth's core-mantle boundary through synchrotron experiments[#]. ***AGU Fall Meeting 2024***, USA. December 2024. (Oral presentation; MR21A-07)
- **Taehyun Kim**, Sang-Heon Shim, Stella Chariton, Vitali Prakapenka, Martin Kunz, Katherine Armstrong. Iron metal formation from silicate melts at 55–75 GPa and 4000–6000 K. ***AGU Fall Meeting 2024***, USA. December 2024. (Poster presentation)
- Sibo Chen, **Taehyun Kim**, Xuehui Wei and Sang-Heon Shim. Partitioning of potassium between FeO and Fe metal impacted by hydrogen and implications for Earth's core. ***AGU Fall Meeting 2024***, USA. December 2024.
- **Taehyun Kim**, Xuehui Wei, Kurt Leinenweber, Shize Yang, Stella Chariton, Vitali Prakepenka, Young-Jay Ryu, Yongjae Lee, Sang-Heon Shim. High-pressure experiments support compositional gradients in sub-Neptune interiors. ***Exoplanets in Our Backyard 3***, USA. November 2024. (Poster presentation)

- Sang-Heon Shim, **Taehyun Kim**, Xuehui Wei, Stella Chariton, Vitali Prakapenka, Young-Jay Ryu, Shize Yang. Formation of hydride perovskite and water on hot hydrogen-rich exoplanets. ***GSA (The Geological Society of America) Connects 2024 Meeting***, USA. September 2024.

- Sibo Chen, Shize Yang, **Taehyun Kim**, Xuehui Wei, and Sang-Heon Shim. Sub-nanometer detection of hydrogen in minerals using vibrational electron energy loss spectroscopy. ***GSA (The Geological Society of America) Connects 2024 Meeting***, USA. September 2024.

- **Taehyun Kim**, Xuehui Wei, Stella Chariton, Vitali Prakapenka, Young-Jay Ryu, Shize Yang, and Sang-Heon Shim. Formation of Mg-hydrides and water from reaction between MgO and hydrogen and implication for sub-Neptune exoplanets. ***AGU Fall Meeting 2023***, USA. December 2023. (Oral presentation; DI51A-07)

- **Taehyun Kim**, Stella Chariton, Vitali Prakapenka, Young-Jay Ryu, Shize Yang, and Sang-Heon Shim. Effect of H_2-to-H_2O ratio on the stability of silicates in sub-Neptune exoplanets. ***AGU Fall Meeting 2023***, USA. December 2023. (Poster presentation; P23F-3106)

- Sibo Chen, Shize Yang, **Taehyun Kim**, Xuehui Wei, and Sang-Heon Shim. A nondestructive sub-nanometer probe for hydrogen in high-pressure minerals: vibrational electron energy loss spectroscopy. ***AGU Fall Meeting 2023***, USA. December 2023.

- Sang-Heon Shim, Harrison W Horn, **Taehyun Kim**, Helene Piet, Sergio Speziale, Yongjae Lee, Stella Chariton, and Vitali Prakapenka. High-pressure chemistry linking dry and wet planets. ***23rd Biennial Conference of the APS Topical Group on Shock Compression of Condensed Matter***, USA. June 2023.

- **Taehyun Kim**, Joseph G O'Rourke, Jeongmin Lee, Stella Chariton, Vitali Prakapenka, Rachel Husband, Nico Giordano, Hanns-Peter Liermann, Yongjae Lee, and Sang-Heon Shim. Possible link between deeply subducted water and the E' layer. ***AGU Fall Meeting 2022***, USA. December 2022. (Oral presentation)

- **Taehyun Kim**, Eran Greenberg, Vitali Prakapenka, Yongjae Lee, and Sang-Heon Shim. Melting behaviors of hydrous pyrolite in the lower mantle. ***AGU Fall Meeting 2022***, USA. December 2022. (Oral presentation)

- **Taehyun Kim**, Xuehui Wei, Stella Chariton, Vitali Prakapenka, and Sang-Heon Shim. Impact of the H_2/H_2O ratio on the internal structure of Uranus, Neptune, and sub-Neptune exoplanets. ***Exoplanets in Our Backyard 2***, USA. November 2022. (Oral presentation)

- **Taehyun Kim**, Yongjae Lee, Stella Chariton, Vitali Prakapenka, Anna Pakhomova, Hanns-Peter Liermann, Zhenxian Liu, Sergio Speziale, and Sang-Heon Shim. Solubility of MgO in H_2O-H_2 at high pressures and its implications for large water-rich planets. ***54th Annual DPS (Division for Planetary Sciences) Meeting***, Canada. October 2022. (Oral presentation)

- Sang-Heon Shim, Helene Piet, Suyu Fu, Byeongkwan Ko, **Taehyun Kim**, Yongjae Lee, Vitali Prakapenka, and Stella Chariton. Impacts of hydrogen on the chemistry and structure of rocky planets cores. ***AGU Fall Meeting 2021***, New Orleans. December 2021.

- **Taehyun Kim**, Stella Chariton, Vitali Prakapenka, Anna Pakhomova, Hanns-Peter Liermann, Zhenxian Liu, Sergio Speziale, Sang-Heon Shim, and Yongjae Lee. Atomic scale mixing between MgO and H_2O in the deep interiors of water-rich planets. ***Europlanet Science Congress 2021*** (Session: Ice Giant System Science and Exploration), Germany. September 2021 (Virtual meeting). (Oral presentation)

- **Taehyun Kim**, Jeongmin Lee, Stella Chariton, Vitali Prakapenka, Rachel Husband, Nico Giordano, Hanns-Peter Liermann, Sang-Heon Shim, and Yongjae Lee. Water may limit silicon amount in the Earth's core. ***2021 COMPRES Annual Meeting***, USA. August 2021 (Virtual meeting). (Oral presentation)
- Sang-Heon Shim, Carole Nisr, **Taehyun Kim**, Yongjae Lee, Andrew Chizmeshya, Kurt Leinenweber, Stella Chariton, Vitali Prakapenka, Sergio Speziale, Zhenxian Liu, and Hanns-Peter Liermann. Mineral-water reaction at high pressures–implications for Uranus and Neptune. ***52nd Lunar and Planetary Science Conference***, USA. March 2021.
- **Taehyun Kim**, Stella Chariton, Vitali Prakapenka, Anna Pakhomova, Hanns-Peter Liermann, Zhenxian Liu, Sergio Speziale, Sang-Heon Shim, and Yongjae Lee. Atomic scale mixing between (Mg,Fe)O and H_2O in the deep interiors of water-rich planets. ***DESY Photon Science Users' Meeting 2021*** (Session: Status and research highlights of the ECB (P02.2) at PETRA III), Germany. January 2021 (Virtual meeting). (Oral presentation)
- Britany Kulka, **Taehyun Kim**, Jeongmin Lee, Stella Chariton, Vitali Prakapenka, Yongjae Lee, and Sang-Heon Shim. Possible control of redox conditions in the laser-heated diamond-anvil cell. ***AGU Fall Meeting 2020***, USA. December 2020.
- Byeongkwan Ko, **Taehyun Kim**, Eran Greenberg, Vitali Prakapenka, Yongjae Lee, Sang-Heon Shim. Temperature-dependent solubility of Uranium in silicate perovskites in the Earth's lower mantle. ***2020 COMPRES Annual Meeting***, USA. August 2020.
- **Taehyun Kim**, Sang-Heon Shim, Vitali Prakapenka, Hanns-Peter Liermann, Sergio Speziale, and Yongjae Lee. High Solubility of Mg in H_2O at high pressures and its implications for the interiors of water-rich planets. ***Exoplanets in Our Backyard***: Solar System and Exoplanet Synergies on Planetary Formation, Evolution, and Habitability Workshop, USA. February 2020. (Poster presentation)
- Yoonah Bang, Huijeong Hwang, **Taehyun Kim**, Hyunchae Cynn, Haemyeong Jung, Changyong Park, Dmitry Popov, Vitali B. Prakapenka, Hanns-Peter Liermann, Lin Wang, Tetsuo Irifune, Ho-Kwang Mao, and Yongjae Lee. The stability of subducted glaucophane with the Earth's secular cooling. ***AGU Fall Meeting 2019***, USA. December 2019.
- **Taehyun Kim**, Sang-Heon Shim, Byeongkwan Ko, Eran Greenberg, Vitali Prakapenka, and Yongjae Lee. Low melting temperatures of anhydrous and hydrous mantle materials at the core-mantle boundary. ***AGU Fall Meeting 2019***, USA. December 2019. (Poster presentation)
- **Taehyun Kim**, Youngnam Lee, and Yongjae Lee. Comparative mineralogical and geochemical investigation of fossils from Mongolia and Korea. ***Goldschmidt***, Japan. August 2016. (Poster presentation)

Proposals

Research (* denotes Principal Investigator)

The proposals listed below (typically 5–7 pages in length) are evaluated by review panels and selected by beamline scientists at synchrotron facilities. I acquire *beam time* to obtain key datasets at high pressures and high temperatures for my past, current, and future projects.

- Advanced Photon Source, USA (proposal number, year)

GUP-57624 (2018), *GUP-62881 (2019), *GUP-67454 (2020), GUP-67458 (2020), GUP-74297 (2021), *GUP-76095 (2021), *GUP-78985 (2022). *Currently in upgrade and GSECARS is scheduled to reopen in early 2025.* *1006895 (2024), 1006967 (2024). 1009966 (2025).

- Advanced Light Source, USA

  ALS-10047 (2018), ALS-12208 (2023)

- Pohang Light Source-II, South Korea

  2015-3rd-6C-010 (2015), 2016-1st-6C-003 (2016)

Grants

As the Principal Investigator, I recently submitted a full research proposal (No. 2445393) to the Geophysics program in the GEO-EAR division of NSF. I am currently awaiting their evaluation.

I contributed content[#] to the grant proposals listed below, did internal review[##], and gave presentations[###] during the deliberation process on scientific instruments. The grants listed below provide fundamental funding for my past and current projects.

- NRF-2018R1A3B1052042[#,##,###] (Leader Researcher program of the Korean Ministry of Science and ICT), 2018-2026. PI: Y. Lee. 100% recognition for Lee.
- NSF-AST2108129[#], 2021-2023. Ingassing of Hydrogen in the Interiors of Sub-Neptunes and Gas Giants. PI: S.-H. Shim. 100% recognition for Shim.
- NSF-AST2406790[#,##], 2024-2026. Research on Reaction between H_2-H_2O Fluid and Silicate, and Implications for Uranus and Neptune. PI: S.-H. Shim. 100% recognition for Shim
- NASA-80NSSC25K7021[#,##], 2024-2027. Iron and its Impact in Magma Oceans of Emerging Rocky Planets. PI: S.-H. Shim.

Mentoring

Teaching Assistant

- 2016 Fall. ESS8509-01, Research frontiers in Earth System Sciences, Yonsei University
- 2016 Spring. ESS4126-01, Senior Thesis*, Yonsei University

  *Guided undergraduate students in the Earth System Sciences through research and writing for graduation thesis.

Services

Outreach

- 2024 October. Volunteer, Earth and Space Exploration Day, ASU Tempe Campus
- 2024 August. Volunteer, SESE Symposium, ASU Tempe Campus

- 2023 November. Volunteer, Earth and Space Exploration Day, ASU Tempe Campus
- 2023 July. Interview, The Washington Post, article title: The U.S. is About to Open a New Window into Earth's Mysterious Insides.

Academic service

- Journal Article Review : Nature Astronomy, Nature Communications, Earth and Planetary Science Letters, Progress in Earth and Planetary Science
- Grant Proposal Review : National Science Foundation EAR – Petrology and Geochemistry, National Science Foundation EAR – Postdoctoral Fellowship
- Committee of the ASU Geophysical Seminar Series (2023–2024)

Military service

- Republic of Korea Defense Intelligence Command, South Korea (2011–2013)

Honors

- 2022. Excellent Academic Paper Award, Yonsei University.

Membership

- American Geophysical Union (AGU)
- American Astronomical Society (AAS)
- Geochemical Society, USA