

S.-H. Dan Shim | Curriculum Vitae

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Degrees

2001: Ph.D. Geosciences, Princeton University, Princeton, New Jersey, USA.

Thesis Adviser: Dr. Thomas S. Duffy

1994: M.S. Geological Sciences, Seoul National University, Seoul, Korea.

Thesis Adviser: Drs Soo Jin Kim and Jung Ho Ahn

1992: B.S. Geological Sciences, Seoul National University, Seoul, Korea.

Academic Appointments

2022–: Navrotsky Professor of Materials Research, College of Liberal Arts and Sciences, Arizona State University, USA.

2021–: Professor, School of Earth and Space Exploration, Arizona State University, USA.

2012–2021: Associate Professor, School of Earth and Space Exploration, Arizona State University, USA.

2015–: Honors Faculty, Barrett Honors College, USA.

2019: Visiting Professor, Yonsei Frontier Lab program, Yonsei University, Seoul, Korea.

2014: Visiting Researcher, Institut de Physique du Globe de Paris (IPGP), Paris, France.

2008–2011: Associate Professor of Experimental Geophysics, Massachusetts Institute of Technology, USA.

2003–2008: Assistant Professor of Experimental Geophysics, Massachusetts Institute of Technology, USA.

2001–2003: Miller Research Fellow, University of California at Berkeley, USA.

Research Interests

Structure and dynamics of the deep planetary interiors. Magma ocean and early evolution of planets. Hydrogen storage and transport in the deep mantles and the cores of planets. Structure and dynamics of exoplanets (sub-Neptunes, gas giants, and waterworlds). In situ measurements of crystal structures, chemical reactions, equations of states, and physical properties in diamond-anvil cell using synchrotron X-ray techniques. Application of X-ray free electron laser techniques for high pressure research. Development of new materials at high pressures and high temperatures. Hydrogen storage in materials with naturally abundant elements.

Honors

2017: Nomination for the College of Liberal Arts and Sciences Zebulon Pearce Distinguished Teaching Award, Arizona State University

2010: Doornbos Memorial Prize, Studies of the Earth's Deep Interior, International Union of Geodesy and Geophysics (IUGG)

2004: Jephtha H. and Emily V. Wade Award, Massachusetts Institute of Technology

2001–2003: Miller Research Fellowship, University of California, Berkeley

2001: Graduate Research Award, Mineral and Rock Physics Section, American Geophysical Union (AGU)

2000: Outstanding Student Paper Award, Tectonophysics Section, American Geophysical Union (AGU)

2000–2001: Charlotte Elizabeth Procter Fellowship, Princeton University








1999–2000: Research Board Tuition Award, Princeton University

1999: Travel Grant, Association of Princeton Graduate Alumni, Princeton University

1996: Hess Fellowship, Department of Geosciences, Princeton University

1992: Top-Honors Graduate, College of Natural Sciences, Seoul National University

Published Articles

7. **H. Piet**^{PD}, A. V. G. Chizmeshya, B. Chen, S. Chariton, E. Greenberg, V. B. Prakapenka, P. R. Buseck, **S.-H. Shim**^{PI}. Effect of nickel on the high-pressure phases in Fe–H. *Physical Review B*, DOI: 10.1103/PhysRevB.104.224106 [↗](#), 2021. 
6. **H. Piet**^{PD}, K. Leinenweber, E. Greenberg, V. B. Prakapenka, and **S.-H. Shim**^{PI}. Effects of hydrogen on the phase relations in Fe–FeS at pressures of Mars-sized bodies. *Journal of Geophysical Research - Planet*, DOI: 10.1029/2021JE006942 [↗](#), 2021. 
5. **T. Kim**^{VGS}, S. Chariton, V. Prakapenka, A. Pakhomova, H.-P. Liermann, Z. Liu, S. Speziale, **S.-H. Shim**^{PI}, and Y. Lee. Atomic scale mixing between MgO and H₂O in the deep interiors of water-rich planets. *Nature Astronomy*, DOI: 10.1038/s41550-021-01368-2 [↗](#), 2021. 
Press release: Salon [↗](#), *ASU* [↗](#), *Nature Astronomy News and Views* [↗](#) .
4. **H. Allen-Sutter**^{GS}, E. Garhart, K. Leinenweber, V. B. Prakapenka, E. Greenburg, and **S.-H. Shim**^{PI}. Oxidation of the interiors of carbide exoplanets. *Planetary Science Journal*, DOI: 10.3847/PSJ/abaa3e [↗](#), 2020. 
Press release: CNN [↗](#), *Pre-print is available at arXiv:2005.03175* [↗](#) .
3. **C. Nisr**^{PD}, **H. Chen**^{GS}, K. Leinenweber, A. V. G. Chizmeshya, V. B. Prakapenka, C. Prescher, S. Tkachev, Y. Meng, Z. Liu, and **S.-H. Shim**^{PI}. Large H₂O solubility in dense silica and its implications for the interiors of water-rich planets. *Proceedings of the National Academy of Sciences*, DOI: 10.1073/pnas.1917448117 [↗](#), 2020.  
Press release: Selected for Media Highlight by PNAS, ASU Now [↗](#), *Advanced Photon Source Science Highlights* [↗](#), *Phys.org* [↗](#), Argonne National Laboratory Press Release [↗](#)
2. C. M. Lisse, S. J. Desch, C. T. Unterborn, S. R. Kane, P. R. Young, H. E. Hartnett, N. R. Hinkel, **S.-H. Shim**, E. E. Mamajek, and N. R. Izenberg. A geologically robust procedure for observing rocky exoplanets to maximize the likelihood that atmospheric oxygen is an Earth-Like biosignature. *Astrophysical Journal Letters*, DOI: 10.3847/2041-8213/ab9b91 [↗](#), 2020. 
1. **J. G. O'Rourke**^{PD} and **S.-H. Shim**. Hydrogenation of the Martian core by hydrated mantle minerals with implications for the early dynamo. *Journal of Geophysical Research - Planets*, 124, 3422–3441, DOI: 10.1029/2019JE005950 [↗](#), 2019. 