

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

- 2012– **Associate Professor**, School of Earth and Space Exploration, Arizona State University, USA.
- 2015– **Honors Faculty**, Barrett Honors College, USA.
- 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.

Other Employments

- 1994–1996 **Exploration Scientist**, Army, Korea.
- 1993–1994 **Research Intern**, Korea Ocean Research and Development Institute, Korea.

Honors

- 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

Undergraduate Students Supervised

- 2015–2016 Shaela Noble, ASU
- 2007–2009 Alison Piasecki, MIT
- 2007–2008 Scott Berdahl, MIT
- 2007–2008 Aron Walker, MIT
- 2007 Jenna Berkowitz, MIT

Undergraduate Research Program Students

- 2017– Jacqueline Tappan, Undergraduate Researcher, ASU
- 2017– Jonathan Dolinschi, Undergraduate Researcher, ASU
- 2016– Abigail Weibel, Undergraduate Researcher, ASU
- 2015–2016 Patrick Kennedy, Undergraduate Researcher, ASU
- 2015–2016 Mark Williamson, Undergraduate Researcher, ASU
- 2009 Elizabeth George, Undergraduate Research Opportunities Program, MIT (now Detector Engineer at European Southern Observatory, Munich, Germany)
- 2008 Michael DeMeo, Leslie C. Patron Undergraduate Research Opportunity Program, MIT (now Application Engineer at Exa Corporation, Detroit, MI, USA)
- 2008 Deidre LaBounty, Undergraduate Research Opportunities Program, MIT (now Graduate Student at University of Alaska Fairbanks)
- 2007–2008 Rachel Zucker, Leslie C. Patron Undergraduate Research Opportunity Program, MIT (now Senior Research Scientist at Kernel, CA, USA)
- 2006 Sarah Slotznick, Leslie C. Patron Undergraduate Research Opportunity Program, MIT (now Miller Postdoctoral Fellow, Department of Earth and Planetary Science, University of California, CA, USA)
- 2004–2005 Nicholas Leiby, Undergraduate Research Opportunities Program, MIT (now Lead Data Scientist at Kyruus, Alexandria, VA, USA)

Supervised B.S. Thesis

- 2015– Shaela Noble, ASU
- 2006–2007 Caitlin Murphy, MIT (now an AAAS Congressional Science Fellow)

Ph.D. Students

- 2014– Byeongkwan Ko, ASU
- 2014– Huawei Chen, ASU
- 2012–2013 Qian Zhang, Visiting graduate student from Peking University (China) to ASU
- 2010–2012 Chen Gu, MIT
- 2005–2011 Krystle Catalli, Department of Energy / National Nuclear Security Administration Stewardship Science Graduate Fellow, MIT (received 2010 Mineral and Rock Physics Graduate Student Research Award, AGU, now principal engineer at Apple, Inc)

Graduate Students

- 2017 Jonathan Hoh, Second generals research project, supervisor: Chris Groppi, ASU
- 2017 Alexandra Pye, Second generals research project, supervisor: Kip Hodges, ASU
- 2016 Shaela Noble, Master degree student, ASU
- 2015– Alyssa Anderson, Second generals research project, supervisor: Kip Hodges, ASU
- 2008–2012 Xuefeng Shang, Second generals research project, supervisor: Robert van der Hilst, MIT
- 2008–2012 Nathaniel Dixon, Second generals research project, supervisor: William Durham, MIT
- 2008–2011 Qin Cao, Collaboration with Robert van der Hilst, MIT
- 2006–2007 Ping Wang, Collaboration with Robert van der Hilst, MIT
- 2004–2006 Rosalee Lamm, Second generals research project, supervisor: Robert van der Hilst, MIT
- 2004–2005 Scott Lundin, MIT (now staff scientist at Engineering and Environment Solutions Group, Inc., RI)

Postdoctoral Researchers

- 2017– Hélène Piet, ASU
- 2017– Joseph O'Rourke, Exploration Postdoctoral Fellow, ASU
- 2016– Cayman Unterborn, Exploration Postdoctoral Fellow, ASU
- 2012– Carole Nisr, ASU (now Research Associate, ASU)
- 2012–2014 Yu Ye, ASU (now associate professor at Wuhan University, China)
- 2011 Antonio Buono, MIT (now research scientist at ExxonMobil)
- 2008–2011 Brent Grocholski, MIT (now associate editor in journal *Science*)
- 2006–2007 Justin Hustoft, MIT (now assistant professor at Simpson University, CA)
- 2004–2006 Javier Santillán, MIT, Ford Postdoctoral Fellow (now Global CT Manager at Apple, CA)

2003–2005 Sandeep Rekhi, MIT (now principal engineer at Apple, CA)

Service

- 2017– Member of Materials Characterization and Synthesis Board, ASU
- 2016– Geophysics Faculty Search committee, SESE, ASU
- 2016– Geochemistry Faculty Search committee, SESE, ASU
- 2016 Graduate student recruiting committee chair, SESE, ASU
- 2013–2016 Graduate student recruiting committee, SESE, ASU
- 2012–2013 Geophysics Faculty Search Chair, SESE, ASU
- 2012 Award Committee, SESE, ASU
- 2009–2010 Graduate Admissions Committee, EAPS, MIT
- 2008–2009 Graduate Committee, EAPS, MIT
- 2006–2007 Independent Activities Period Educational Program Committee, EAPS, MIT
- 2007 Promotion Committee for Chatterjee to Senior Research Scientist, EAPS, MIT
- 2006 Theoretical Geophysics Faculty Search Committee, EAPS, MIT
- 2003–2006 Graduate Admissions Committee, EAPS, MIT

Ph.D. Thesis Committees

- 2015–2016 Shkolyar Svetlana, ASU
- 2014–2015 Jeffrey Lockridge and Rebecca Smith, ASU
- 2014 Mingming Li and Michael Pagano, ASU
- 2011 Krystle Catalli, Michael Krawczynski, and Qin Cao, MIT
- 2010 Jay Barr, MIT
- 2007 Emily Van Ark, Guangping Xu, and Ping Wang, MIT
- 2006 Shichun Huang, MIT

Master Thesis Committees

- 2011 Stephanie Brown, MIT

Generals Committees

- 2017 Hanna Shamloo, ASU
- 2016 Huawei Chen, Byeongkwan Ko, Kara Brugman, Alyssa Anderson, ASU
- 2015 Megan Miller (Committee Chair), Julie Mitchell, and Hongyu Lai, ASU
- 2014 Luke Probst, Ruirui Han, Jinping Hu (Committee Chair), and Christopher Haberle, ASU
- 2013 Jeffrey Lockridge and Jinping Hu, ASU
- 2012 Chen Gu, MIT

- 2009 Qin Cao (Committee Chair), Nathan Dixon, and Xuefeng Shang, MIT
- 2007 Krystle Catalli, MIT
- 2006 Jay Barr and Noah McLean, MIT

Teaching

- 2017 Spring GLG294/598. Python for Earth Science, ASU
- 2016 Fall GLG494/598. Advanced Mineralogy: Crystallography and Spectroscopy, ASU
- 2016 Spring GLG101. Introduction to Geology I (Physical), ASU
- 2015 Fall GLG591. Introduction to Mineral Physics, ASU
- 2015 Spring GLG305. Dynamic Earth, ASU
- 2014 Fall GLG591. Archean Geophysics (co-teach with A. Anbar), ASU
- 2014 Fall GLG494/598. Advanced Mineralogy: Crystallography and Spectroscopy, ASU
- 2014 Spring GLG305. Dynamic Earth, ASU (co-teach with D. DeVecchio)
- 2014 Spring GLG591. Chemical Processes in Earth's Interior, ASU
- 2013 Fall GLG598. Planetary Materials, ASU
- 2013 Spring GLG101. Introduction to Geology I (Physical), ASU
- 2011 Spring 12.591. Hydrogen: from Planetary to Energy Sciences, MIT
- 2010 Fall 12.591. Volatiles in the Earth and Planetary Interiors, MIT
- 2010 Spring 12.108. Structure of Earth Materials, MIT
- 2009 Fall 12.591. The Core-Mantle Boundary, MIT
- 2009 Spring 12.108. Structure of Earth Materials, MIT
- 2008 Fall 12.575. Introduction to Mineral Physics, MIT
- 2008 Spring 12.108. Structure of Earth Materials, MIT
- 2007 Spring 12.080. EAPS Undergraduate Seminar, MIT
- 2007 Spring 12.108. Structure of Earth Materials, MIT
- 2006 Fall 12.080. EAPS Undergraduate Seminar, MIT
- 2006 Spring 12.080. EAPS Undergraduate Seminar, MIT
- 2005 Fall 12.571. Deep Water - Geophysical Prospective, MIT
- 2005 Spring 12.581. Phase Transitions in the Earth's Interior, MIT
- 2004 Fall 12.580. Introduction to Mineral Physics, MIT
- 2004 Spring 12.570. Structure and Dynamics of the Core-Mantle Boundary Region, MIT

External Service

- 2017– Member, Review panel for the CSEDI program, NSF
- 2015– Member, Facilities Committee, Consortium for Materials Properties Research in Earth Sciences (COMPRES)
- 2013– Member, Advanced Photon Source Proposal Review Panel, High Pressure

- 2013–2015 Editor, Geophysical Journal International
- 2010–2015 Member, Executive Committee, Mineral and Rock Physics Focus Group, American Geophysical Union
- 2010–2014 Vice chair, Subcommittee for Spectroscopy, diffraction, and new instrumentations in mineral physics, Commission of Physics of Minerals, International Mineralogical Association
 - 2010 Consulting editor, Odyssey - Adventures in Science, Science magazine for middle schoolers, "That Rocks!" issue
- 2004–2010 Member, Infrastructure Development Committee, Consortium for Materials Properties Research in Earth Sciences (COMPRES)
- 2008–2010 Convener, Union, Study of Earth's Deep Interior, Planetary Sciences, and Mineral Physics sessions, American Geophysical Union Meetings
 - 2008 Member, International Organizing Committee, 4th Asian Conference in High Pressure Research, Seoul, Korea
- 2004–2006 Associate editor, American Mineralogist
 - 2004 Peer referee for Nature, Science, Science Advance, Geophysical Research letters, Proceedings of the National Academy of Sciences, Journal of Geophysical Research, American Mineralogist, Earth and Planetary Science Letters, Physics of the Earth and Planetary Interiors, Physical Review, Journal of Solid State Chemistry, NSF Geophysics, NSF Geochemistry and Petrology, NSF Earth Sciences: Instrumentation and Facilities, NSF Materials Research, European Science Foundation EuroMinSc

Invited Lectures for the Past 3 Years

- 2016 Public lecture on Earth's interior, KAOS foundation, Seoul, Korea (iKAOS.org; broadcasted through YTN Science; video available at <https://www.youtube.com/watch?v=Mup51I007TU>YouTube)
- 2016 School of Earth and Environmental Sciences, Seoul National University, Seoul, Korea
- 2016 Korea Basic Science Institute (KBSI), Chungju, Korea
- 2016 Invited lecturer, Cooperative Institute for Dynamic Earth Research, 2016 Summer Program, "Flow in the Deep Earth"
- 2016 Deutsches Elektronen-Synchrotron – Arizona State University workshop, Hamburg, Germany
- 2016 Bavarian Research Institute of Experimental Geochemistry and Geophysics (BGI) University of Bayreuth, Bayreuth, Germany
- 2016 ISEI Misasa VI Symposium, Okayama University, Japan
- 2016 Seismology Seminar, Berkeley Seismology Laboratory, Berkeley, CA
- 2015 DI52B-01, American Geophysical Union Fall Meeting, San Francisco, CA

- 2015 Carbon at Extreme Conditions, Centre Européen de Calcul Atomique et Moléculaire (CECAM), CECAM-ETHZ, Lugano, Switzerland
- 2014 MR23D-01, American Geophysical Union Fall Meeting, San Francisco, CA
- 2014 Department of Geology and Geophysics, University of Utah, Salt Lake City, UT
- 2014 Deep Earth Processes: Windows on the Working of a Planet, London, UK
- 2014 PURE-4 meeting (IPGP-UCL), Paris, France
- 2014 ppv@10: a meeting for the 10th anniversary of the discovery of post-perovskite, University of Bristol, UK
- 2014 Umgrove Lectures, Department of Geosciences, Universiteit Utrecht, Nederland
- 2014 Institut de Physique du Globe de Paris (IPGP), Paris, France

Funded Grants

- 2017–2019 NSF-EAR1725094, Calcium in Bridgmanite in the Deep Mantle, 6/15/2017–6/15/2019 (PI: S.-H. Shim)
- 2016–2018 The Keck Foundation, Water from the Heavens: The Origins of Earth's Hydrogen, 1/1/2016–12/31/2018 (PI: P. Buseck)
- 2014–2019 NASA, Exoplanetary Ecosystems: Exploring Life's Detectability on Chemically Diverse Exoplanets, 12/31/2014–12/30/2019 (PI: S. Desch)
- 2014–2016 NSF-EAR1401270, CSEDI Collaborative Research: Deep Mantle Cycling of Oceanic Crust, 9/1/2014–8/31/2016 (PI: E. Garnero)
- 2013–2018 NSF-FESD-Type I, The Dynamics of Earth System Oxygenation, 9/1/2013–8/31/2018 (PI: A. Anbar)
- 2013–2016 NSF-EAR1321976, Hydration of Dense Polymorphs of Silica in Subducting Slabs, 8/1/2013–7/31/2016 (PI: K. Leinenweber)
- 2011–2015 NSF-EAR1301813, The Perovskite to Post-Perovskite Phase Boundary in Mantle Rocks, 1/1/2011–12/31/2015 (PI: S.-H. Shim)
- 2010–2015 NSF-EAR1316022, CSEDI Collaborative Research: Valence state of iron in the lower mantle (co-PI: Morgan), 9/1/2010–8/31/2015 (PI: S.-H. Shim)
- 2009–2014 NSF-EAR1316007, Understanding the Complexity near the 660-km Seismic Discontinuity, 12/15/2009–11/30/2015 (PI: S.-H. Shim)
- 2008–2011 NSF-EAR0757871, CSEDI Collaborative Research: Multi-scale Analysis of Mantle Discontinuities using Inverse Scattering of SS Waves and Experimental Mineral Physics (PI: R. van der Hilst), 07/01/2008–06/30/2011
- 2010–2011 NSF-DMR0819762, CMSE-Initiative 3, as a co-PI, 06/01/2010–05/30/2011
- 2008–2010 NSF-EAR0738655, Equation of State and Phase Boundary of Post-Perovskite, 01/01/2008–12/31/2010 (PI: S.-H. Shim)

- 2004–2008 NSF-EAR0337005, In situ Raman Spectroscopy Study for Phase Diagrams of Mantle Minerals at High Pressure and Temperature, 07/01/2004–06/30/2008 (PI: S.-H. Shim)
- 2004–2006 NSF-EAR0337156, Acquisition of a Combined Micro-Raman Spectroscopy and Laser Heating System for in situ High Pressure and High Temperature Studies, 03/10/2004–03/09/2006 (PI: S.-H. Shim)
- 2004 Wade Award, Acquisition of a Double Monochromator for Raman Spectroscopy Measurements at High Pressure and Temperature, 2004 (PI: S.-H. Shim)

Membership

American Geophysical Union
Geochemical Society

Recent Collaborations (3 years)

ASU: E. Garnero and A. McNamara (Structure of the mantle), R. Hervig (SIMS measurements on high pressure samples), K. Leinenweber (hydrous stishovite), P. Buseck and T. Sharp (Application of the TEM techniques for high pressure materials), A. Anbar (Geophysics of Archean), S. Desch and P. Young (Exoplanets), A. Chizmeshya (SMS, high pressure chemistry)

US: E. Alp (Advanced Photon Source), M. Kunz (Advanced Light Source), D. Morgan (Univ. Wisc.; Spin state of iron in oxides), V. B. Prakapenka (GSECARS, Univ. of Chicago), G. Shen (HPCAT, Argonne National Lab)

International: S. Speziale (GeoForschungsZentrum Potsdam, Germany), S. K. Lee (Seoul National Univ., Korea), Y. J. Lee (Yonsei Univ., Korea)

Technical Skills

- Laser heated diamond anvil cell, Multi-anvil press
- Powder X-ray diffraction, Crystal structure refinement using the Rietveld method
- Dispersive- and gated-Raman spectroscopy
- Synchrotron X-ray diffraction and spectroscopy: Advanced Photon Source (Argonne National Laboratory), Advanced Light Source (Lawrence Berkeley National Laboratory), National Synchrotron Light Source (Brookhaven National Laboratory), Cornell High Energy Synchrotron Source (Cornell University), Stanford Synchrotron Radiation Laboratory (Stanford University)
- Computer programming with Python, FORTRAN, IDL, and C languages in UNIX, Windows, and Mac OS X systems

Publications

* Undergraduate student author, † Graduate student author, ‡ Postdoc author in the Shim group

Articles (non peer-reviewed)

2. **S.-H. Shim** and T. Lay. Deep Earth: Post-perovskite at ten. *Nature Geoscience*, 7, 621–623, 2014.
1. T. Lay, D. Heinz, M. Ishii, **S.-H. Shim**, J. Tsuchiya, T. Tsuchiya, R. Wentzcovitch, and D. Yuen. Multidisciplinary impact of the deep mantle phase transition in perovskite structure. *Eos Transactions*, 86, 1–4, 2005.

Papers in Review

1. H. Chen[†], **S.-H. Shim**, K. Leinenweber, V. Prakapenka, Y. Meng, and C. Prescher. Crystal Structure of CaSiO₃ Perovskite at 28–62 GPa and 300 K under Quasi-hydrostatic Stress Conditions. *American Mineralogist*. 2017.

Papers in Press

1. C. Nisr[†], **S.-H. Shim**, K. Leinenweber. Raman Spectroscopy of Water-rich Stishovite and Dense High-Pressure Silica up to 55 GPa. *American Mineralogist*. 2017.

Papers in Peer-Reviewed Journals

57. **S.-H. Shim**, B. Grocholski[‡], Y. Ye[†], E. Alp, S. Xu, D. Morgan, Y. Meng, and V. Prakapenka. Stability of Ferrous-Iron-Rich Bridgmanite under Reducing Mid-Mantle Conditions. *Proceedings of the National Academy of Sciences*, 114, 6468–6473, doi: 10.1073/pnas.1614036114, 2017.
56. C. Nisr[†], K. Leinenweber, V. Prakapenka, C. Prescher, S. Tkachev, **S.-H. Shim**. Phase Transition and Equation of State of Dense Hydrous Silica up to 63 GPa. *Journal of Geophysical Research*, doi:10.1002/2017JB014055, 2017.
55. Y. Ye[†], V. Prakapenka, Y. Meng, and **S.-H. Shim**. Inter-comparison of the Gold, Platinum, and MgO Pressure Scales up to 140 GPa and 2,500 K. *Journal of Geophysical Research*, 122, 3450–3464, doi:10.1002/2016JB013811, 2017.
54. C. Nisr[†], Y. Meng, A. MacDowell, J. Yan, V. Prakapenka, and **S.-H. Shim**. Thermal Expansion of SiC at High Pressure–Temperature and Implications for Thermal

Convection in the Deep Interiors of Carbide Exoplanets. *Journal of Geophysical Research: Planets*, 122, 10.1002/2016JE005158, 2017.

53. E. J. Garnero, A. K. McNamara, and **S.-H. Shim**. Continent-sized anomalous zones with low seismic velocity at the base of Earth's mantle. *Nature Geoscience*, 9, 481–489, 2016.
52. H. Piet, J. Badro, F. Nabiei, T. Dennenwaldt, **S.-H. Shim**, M. Cantoni, C. Hébert, and Philippe Gillet. Spin and valence dependence of iron partitioning in Earth's deep mantle. *Proceedings of the National Academy of Sciences*, doi:10.1073/pnas.1605290113, 2016.
51. K. Vilella, **S.-H. Shim**, C. G. Farnetani, and J. Badro. Spin state transition and partitioning of iron: effects on mantle dynamics. *Earth and Planetary Science Letters*, 417, 57–66, 2015.
50. M. Pagano, A. Truitt, P. A. Young, and **S.-H. Shim**. The chemical composition of τ Ceti and possible effects on terrestrial planets. *Astrophysical Journal*, 803, 2015.
49. S. Xu, **S.-H. Shim**, and D. Morgan. Origin of Fe^{3+} in Fe-containing, Al-free mantle silicate perovskite. *Earth Planetary Science Letters*, 409, 319–328, 2015.
48. Y. Ye[‡], C. Gu[†], **S.-H. Shim**, Y. Meng, and Y. Prakapenka. The postspinel boundary in pyrolytic compositions determined in the laser-heated diamond anvil cell. *Geophysical Research Letters*, 41, 3833–3841, 2014.
47. X. Shang, **S.-H. Shim**, M. V. de Hoop, and R. D. van der Hilst. Multiple seismic reflectors in Earth's lowermost mantle. *Proceedings of the National Academy of Sciences*, 111, 2442–2446, 2014.
46. P. A. Young, S. J. Desch, A. D. Anbar, R. Barnes, N. R. Hinkel, R. Kopparapu, N. Madhusudhan, N. Monga, M. D. Pagano, M. A. Riner, E. Scannapieco, **S.-H. Shim**, and A. Truitt. Astrobiological stoichiometry. *Astrobiology* 14, 603–626, 2014.
45. B. Grocholski[‡], **S.-H. Shim**, E. Cottrell, and V. B. Prakapenka. Crystal structure and compressibility of lead dioxide up to 140 GPa. *American Mineralogists*, 99, 170–177, 2014.
44. B. Grocholski[‡], **S.-H. Shim**, V. Prakapenka. Stability, metastability, and elastic properties of a dense silica polymorph, seifertite. *Journal of Geophysical Research*, 118, B50360, 2013.
43. C. Gu[†], K. Catalli[†], B. Grocholski[‡], L. Gao, E. Alp, P. Chow, Y. Xiao, H. Cynn, W. J. Evans, and **S.-H. Shim**. Electronic structure of iron in magnesium silicate glasses at high pressure. *Geophysical Research Letters*, 39, L24304, 2012.

42. B. Grocholski[‡], K. Catalli[†], **S.-H. Shim**, and V. B. Prakapenka. Mineralogical effects on the detectability of the post-perovskite boundary. *Proceedings of the National Academy of Sciences*, 109, 2275–2279, 2012.
41. K. Catalli[†], **S.-H. Shim**, P. Dera, V. B. Prakapenka, J. Zhao, W. Sturhahn, Y. Xiao, P. Chow, H. Cynn, and W. Evans. Effects of the Fe³⁺ spin transition on the properties of aluminous perovskite – New insights for lower-mantle seismic heterogeneities. *Earth and Planetary Science Letters*, 310, 293–302, 2011.
40. **S.-H. Shim**, D. LaBounty*, and T. S. Duffy. Raman spectra of bixbyite, Mn₂O₃, up to 40 GPa. *Physics and Chemistry of Minerals*, 38, 685–691, 2011.
39. C. Qin, R. D. van der Hilst, M. V. de Hoop, and **S.-H. Shim**. Seismic imaging of transition zone discontinuities suggests hot mantle west of Hawaii. *Science*, 332, 1068–1071, 2011.
38. B. Grocholski[‡], **S.-H. Shim**, and V. B. Prakapenka. Stability of the MgSiO₃ analog NaMgF₃ and its implication for mantle structure in super-Earths. *Geophysical Research Letters*, 37, L14204, 2010.
37. K. Catalli[†], **S.-H. Shim**, V. B. Prakapenka, J. Zhao, W. Sturhahn, P. Chow, Y. Xiao, H. Liu, H. Cynn, and W. J. Evans. Spin state of ferric iron in MgSiO₃ perovskite and its effect on elastic properties. *Earth and Planetary Science Letters*, 289, 68–75, 2010.
36. Q. Cao, P. Wang, R. D. van der Hilst, M. V. de Hoop, and **S.-H. Shim**. Imaging the upper mantle transition zone with a generalized Radon transform of SS precursors. *Physics of the Earth and Planetary Interiors*, 180, 80–91, 2010.
35. K. Catalli[†], **S.-H. Shim**, V. B. Prakapenka, J. Zhao, and W. Sturhahn. X-ray diffraction and Mössbauer spectroscopy of Fe³⁺-bearing Mg-silicate post-perovskite at 128–138 GPa. *American Mineralogist*, 95, 418–421, 2010.
34. R. F. Cooper, R. L. A. Everman, J. Hustoft[‡], and **S.-H. Shim**. Mechanism and kinetics of reduction of a FeO–Fe₂O₃–CaO–MgO aluminosilicate melt in a high-CO activity environment. *American Mineralogist*, 95, 810–824, 2010.
33. K. Catalli[†], **S.-H. Shim**, and V. B. Prakapenka. Thickness and Clapeyron slope of the post-perovskite boundary. *Nature*, 462, 782–785, 2009.
32. B. Grocholski[‡], **S.-H. Shim**, W. Sturhahn, J. Zhao, Y. Xiao, and P. C. Chow. Spin and valence states of iron in (Mg_{0.8}Fe_{0.2})SiO₃ perovskite. *Geophysical Research Letters*, 36, L24303, 2009.
31. **S.-H. Shim** and K. Catalli[†]. Compositional dependence of structural transition pressures in amorphous phases with mantle-related compositions. *Earth and Planetary Science Letters*, 283, 174–180, 2009.

30. **S.-H. Shim**, A. Bengtson, D. Morgan, W. Sturhahn, K. Catalli[†], J. Zhao, M. Lerche, and V. B. Prakapenka. Electronic and magnetic structures of the postperovskite-type Fe₂O₃ and implications for planetary magnetic records and deep interiors. *Proceedings of the National Academy of Sciences*, 106, 5508–5512, 2009.
29. R. Zucker* and **S.-H. Shim**. In situ Raman spectroscopy of MgSiO₃ enstatite up to 1550 K. *American Mineralogist*, 94, 1638–1646, 2009.
28. **S.-H. Shim**, K. Catalli[†], J. Hustoft[‡], A. Kubo, V. B. Prakapenka, W. A. Caldwell, and M. Kunz. Crystal structure and thermoelastic properties of (Mg_{0.91}Fe_{0.09})SiO₃ postperovskite up to 135 GPa and 2700 K. *Proceedings of the National Academy of Sciences*, 105, 7382–7386, 2008.
27. J. Hustoft[‡], K. Catalli[†], **S.-H. Shim**, A. Kubo, V. B. Prakapenka, and M. Kunz. Equation of state of NaMgF₃ postperovskite - implications for the seismic velocity changes in the D'' region. *Geophysical Research Letters*, 35, L10309, 2008.
26. S. Lundin[†], K. Catalli[†], J. Santillán[‡], **S.-H. Shim**, V. B. Prakapenka, M. Kunz, and Y. Meng. Effect of Fe on the equation of state of mantle silicate perovskite over 1 Mbar. *Physics of the Earth and Planetary Interiors*, 168, 97–102, 2008.
25. J. Hustoft[‡], **S.-H. Shim**, A. Kubo, and N. Nishiyama. Raman spectroscopy of CaIrO₃ postperovskite up to 30 GPa. *American Mineralogist*, 93, 1654–1658, 2008.
24. K. Catalli[†], **S.-H. Shim**, and V. B. Prakapenka. A crystalline-to-crystalline phase transition in Ca(OH)₂ at 8 GPa and room temperature. *Geophysical Research Letters*, 35, L05312, 2008.
23. **S.-H. Shim**. The postperovskite transition. *Annual Reviews in Earth and Planetary Sciences*, 36, 569–599, 2008.
22. A. Kubo, B. Kiefer, **S.-H. Shim**, G. Shen, V. B. Prakapenka, R. J. Cava, and T. S. Duffy. Rietveld structure refinement of MgGeO₃ post perovskite phase to 1 Mbar. *American Mineralogist*, 93, 965–976, 2008.
21. S. P. Slotznick* and **S.-H. Shim**. In situ Raman spectroscopy measurements of MgAl₂O₄ spinel up to 1400°C. *American Mineralogist*, 93, 470–476, 2008.
20. R. D. van der Hilst, M. V. de Hoop, P. Wang, **S.-H. Shim**, P. Ma, and L. Tenorio. Seismostratigraphy and thermal structure of Earth's core-mantle boundary region. *Science*, 315, 1813–1817, 2007.
19. **S.-H. Shim**, A. Kubo, and T. S. Duffy. Raman spectroscopy of perovskite and post-perovskite phases of MgGeO₃ to 123 GPa. *Earth and Planetary Science Letters*, 260, 166–178, 2007.
18. J. Santillán[‡], **S.-H. Shim**, G. Shen, and V. B. Prakapenka. High-pressure phase transition in Mn₂O₃ - application for the crystal structure and preferred orientation of the CaIrO₃ type. *Geophysical Research Letters*, 33, L15307, 2006.

17. **S.-H. Shim**, S. Rekhif, M. C. Martin, and R. Jeanloz. Vibrational spectroscopy and X-ray diffraction of Cd(OH)₂ to 23 GPa at 300 K. *Physical Review B*, 74, 024107, 2006.
16. **S.-H. Shim**. Stability of MgSiO₃ perovskite in the lower mantle. In *Earth's Deep Mantle: Structure, Composition, and Evolution*, edited by R. D. van der Hilst, J. Bass, J. Matas, and J. Trampert, volume 160 of Geophysical Monograph Series, 261–282. American Geophysical Union, 2005.
15. **S.-H. Shim**, T. S. Duffy, R. Jeanloz, and G. Shen. Stability and crystal structure of MgSiO₃ perovskite to the core-mantle boundary. *Geophysical Research Letters*, 31, L10603, 2004.
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