

# Hong Yang, Ph.D.

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## EDUCATION

Stanford University, Stanford, California, USA

Ph.D., Earth and Planetary Sciences 2018 – 2024

Committee: Anton Ermakov (chair), Laura Schaefer, Rodney Ewing, Sonia Tikoo, Wendy Mao

M.S., Geophysics 2021 - 2023

Center for High Pressure Science and Technology Advanced Research (HPSTAR), Shanghai, China

M.S., Condensed Matter Physics 2015 - 2018

University of Science and Technology of China (USTC), Hefei, China

B.S., Geochemistry 2011 - 2015

## RESEARCH INTERESTS

Nuclear energy materials, Molten salt(s) chemistry and physics, Critical Minerals, Microscopic observations of Earth materials, High pressure mineralogy, Paleomagnetism, Rock magnetism, Laser shock compression, Materials under extreme conditions

## RESEARCH EXPERIENCE

**Postdoctoral Research Scholar,**

**School of Molecular Sciences, Arizona State University** 2024 – Present

- Structure of molten salts for a carbon-free and safe nuclear energy solution (PI: Hongwu Xu)
- Hydrogen position determination with Polarized Raman Spectroscopy (PI: Hong Yang)
- OpenRaman: Democratizing Access to Spectroscopy Data (Funded by OpenAI-ASU AI challenge, PI: Hong Yang)

**Graduate Research Assistant,**

**Stanford Extreme Environments Lab, PI: Wendy L. Mao** 2018 - 2024

- Noble gas incorporation into silicate glasses at high pressure: implications for deep planetary volatile storage
  - use Brillouin spectroscopy to monitor the solubility of noble gases under pressure
- Oxidation of Mn during impact events in anoxic Martian environments
  - studying Mn valence change by oxidation of water, under pressure, and without oxygen
- Valence state of iron in Fe-N, Fe-C alloys in planetary cores
  - use X-ray absorption spectra to understand the bonding change in iron alloys

**Stanford Paleomagnetism Lab, PI: Sonia M. Tikoo**

2021 - 2024

- Constraining Africa plate motion from paleolatitudes of Walvis Ridge hotspot track
  - Use a 2G superconducting magnetometer to retrieve the direction of Earth's ancient magnetic fields and reconstruct plate movements
  - Use Kappa Bridge magnetic susceptibility meter to characterize magnetic mineralogy of basalts by their amplitude dependence
- Amplitude dependence magnetic susceptibility for quick basalt mineralogy identification
  - Developed a non-destructive technique using amplitude-dependence of magnetic susceptibility for characterizing submarine basalt magnetic mineralogy
  - Conducted rock magnetic measurements, correlating bulk susceptibility with basalt lithology to inform thermal stability and coercivity of magnetic minerals
- Inferring vanadium content in natural magnetite by magnetic properties
  - Develop methods to avoid chemical dissolution of ore samples with strong acids, significantly reducing carbon emissions.

- Identified strong correlations between magnetic properties and minor elements (Mg, Al, Ti), with the potential for visibility of these effects in V-rich samples.

## TEACHING / COMMUNITY SERVICE

**Freelance consultant on graduate school application, postdoc application, PhD wellbeing and Supervisor-supervisee relationship** 2020-2024

**Reviewer for *Geochimica et Cosmochimica Acta*, *Science Bulletin*, *Heritage Science*** 2021-2022

**Department Seminar Organizer**, Department of Geophysics 2022 - Present  
 • Invite and host speakers, arrange meeting schedules and chair the seminar

**Teaching Assistant**, Journey to the Center of Earth, Stanford Winter 2022  
 • Host office hours, help students with homework and online Wikipedia projects  
 Students' Wikipedia pages as final class projects highlighted by WikiEdu

**Student Group Leader**, Stanford Alpine Project 2019 - 2022  
 • Plan, raise funding, and execute field trips to geologically notable locations  
 Participate in Japan trip in 2019 and lead the Hawai'i trip in 2022 (Group of 15, 1 week)

**Department Wellness Liaison**, Department of Geological Sciences 2020 - 2022  
 • Organize activities to promote students' wellness at Stanford Earth

### Science Education Consulting

• TA of Physics at Shanghai Science Association for Young Talents Shanghai, 2017  
 • Judge for 7th grade projects, 2023 Nativity Science Fair Menlo Park, CA, 2023  
 • Judge for 7th Golden Gate Science Olympiad, Environmental chemistry group UC Berkeley, 2023

### Other relevant activities

• Student member of Stanford battery club, Stanford hydrogen club 2023-2024  
 • Bootcamp: Coaching high-performance individuals and team, Stanford Graduate Summer Institute 2023  
 • Meeting volunteer for Stanford Energy Solutions week, Energy Engagement programs 2023  
 • Designing the professional, Stanford d.school 2023  
 • AI in Education: Creating Your AI Course Policy, Stanford Center for Teaching and Learning 2023  
 • Design for Learning: Generative AI for Collaborative Learning, Stanford d.school 2023  
 • Google AI Essentials, Google Career Certificates, Online 2024  
 • ASU AI Community of Practice unconference 2024  
 • ASU carbon summit 2024 2024  
 • Annual Fall Convening - Principled Innovation to Bridge Differences, ASU 2024

## AWARDS

**2024** OpenAI-ASU AI challenge award, Principal Investigator (OpenRaman project)  
**2023** School of Sustainability McGee/Levorsen Research Grant (Vanadium magnetite project)  
**2023** Institute for Rock Magnetism (IRM) Visiting Fellowship  
**2022** IUCr Young and Early Scientist Award, International Union of Crystallography  
**2020** Stanford, The Lorry I. Lokey Fellowship in the School of Earth Sciences  
**2019** Stanford, Professor "Si" Muller Memorial Fellowship  
**2018, 17, 16** HPSTAR, Outstanding Student Scholarship  
**2014** USTC, Outstanding Student Scholarship (Silver Award)

**2013** USTC, Jiuzhang Zhao Scholarship  
**2012** USTC, Scholarship for Climbing Geoscience

## ACTIVE COLLABORATORS SINCE 2020

### Mineral Physics/High energy density science

-- Wendy Mao (Stanford University), Wenzhong Wang (USTC), Arianna Gleason (SLAC), Feng Ke (Yanshan University), Shanyuan Niu (Nanjing University), Silvia Pandolfi (Sorbonne Université), Vitali Prakapenka (UChicago), Roberto Alonso (SLAC)

### Paleomagnetism, Ocean Science, Planetary Science

-- Sonia Tikoo (Stanford), Claire Carvallo (Sorbonne Université), Dario Bilardello (IRM, U of Minnesota), Kevin Gaastra (Caltech-JPL), William Sager (U of Houston), S Thoram (U of Houston), Ji-In Jung (Stanford)

### Nuclear Materials

-- Rodney Ewing(1946 - 2024), Sulgiye Park (Stanford), Hongwu Xu (ASU), Alexandra Navrotsky (ASU)

## PROFESSIONAL SOCIETY MEMBERSHIP

American Geophysical Union, 2015 - current

American Physical Society, 2023 - current

Mineralogical Society of America, 2021 - current

SEES (Synchrotron Earth and Environmental Science), 2023 - current

COMPRES (Consortium for Materials Properties Research in Earth Sciences), 2015 - 2023

FORCE (Facility for Open Research in a Compressed Environment), 2023 - current

The Planetary Society, 2022-current

National Audubon Society, Tucson Audubon Society, Wild Montana, Oregon Wild, Idaho Conservation League

## PUBLICATION

**Yang, H.**, Tikoo, S. M., Hatfield, R. G., Huang, F., Ding, X. Can Vanadium Ores be identified Using Bulk Rock Magnetic Properties? Case study from the Panzhihua Intrusion, Emeishan Large Igneous Province. (*In prep.* Manuscript ready, available upon request)

**Yang, H.**, Niu, S., Park, S., Wei, X., Li, B., Pandolfi, S., Prakapenka, V. B., Chariton, S., Mao, W. L. Anoxic oxidation of Mn by water under pressure: Can giant impact events on Mars generate MnO<sub>2</sub>? (*In prep.* Manuscript ready, available upon request)

**Yang, H.**, Wang, W. Mao, W. L., Iron bonding with light elements: implications for planetary cores beyond the binary system, submitted

Ke, F., Niu, S., Feng, J., Yin, K., Han, M., **Yang, H.**, Wang, B. Y., Chen, H., Zhao, B., Celeste, A., Jia, C., Chen, B., Wang, L., Ravichandran, J., Hwang, H. Y., Tian, Y., Mao, W. L., Lin, Y. Observation of superconductivity in compressed quasi-one-dimensional face-sharing perovskite chalcogenides. Submitted

Morard, G., Hernandez, J.-A., Pege, C., Nagy, C., Libon, L., Lacquement, A., Sokaras, D., Lee, H. J., Galtier, E., Heimann, P., Cunningham, E., S. Glenzer, S., Vinci, T., Prescher, C., Boccato, S., Chantel, J., Merkel, S., Zhang, Y., **Yang, H.**, Wei, X., Pandolfi, S., Mao, W. L., Gleason, A.E., Shim, S.-H., Alonso-Mori, R. and Ravasio, A., 2024. Structural evolution of liquid silicates under conditions in Super-Earth interiors. *Nature Communications*, **15**, 8483. <https://doi.org/10.1038/s41467-024-51796-7> [highlight](#) 🌱

**Yang, H.**, Armstrong, A. R., Austin, A. A., Radousky, H. B., Patel, A. H., Wei, T., et al. 2024. Evidence of non-isentropic release from high residual temperatures in shocked metals measured with ultrafast X-ray diffraction. *Journal of Applied Physics*, <https://doi.org/10.1063/5.0217779> [highlight](#) 🌱

Ricks, M., Gleason A. E., Miozzi F., **Yang, H.**, Chariton, S., Prakapenka V.B., Sinogeikin, S. V., Sandberg R.L., Mao, W.L., Pandolfi, S., 2024. Phase transition kinetics revealed by in situ X-ray diffraction in laser-heated dynamic diamond anvil cells, *Physical Review Research*. <https://doi.org/10.1103/PhysRevResearch.6.013316>

Gu, J., Peng, B., Zhang, J., Ji, X., **Yang, H.**, Hoyos, S., Hirschmann, M., Kite, E., Fisher, R., 2024. Composition of Earth's initial atmosphere and fate of accreted volatiles set by core formation and magma ocean redox evolution, *Earth and Planetary Science Letters*, 629, 118618. <https://doi.org/10.1016/j.epsl.2024.118618>

**Yang, H.**, Tikoo, S. M., Carvallo, C., Bilardello, D., Solheid, P., Gaastra, K. M., Sager, W. W., Thoram, S., Hoernle, K., Höfig, T. W., Avery, A., Del Gaudio, A. V., Huang, Y., Bhutani, R., Buchs, D. M., Class, C., Dai, Y., Dalla Valle, G., Fielding, S., Han, S., Heaton, D. E., Homrighausen, S., Kubota, Y., Li, C.-F., Nelson, W. R., Petrou, E., Potter, K. E., Pujatti, S., Scholpp, J., Shervais, J. W., Tshiningayamwe, M., Wang, X. J., Widdowson, M., 2024. Preliminary characterization of submarine basalt magnetic mineralogy using amplitude-dependence of magnetic susceptibility. *Geochemistry, Geophysics, Geosystems*, 25(2), e2023GC011222. <https://doi.org/10.1029/2023GC011222>

**Yang, H.**, 2023. Using field-dependent magnetic susceptibility to quickly characterize magnetic mineralogy for submarine basalts, *the IRM Quarterly* 33-1, [pdf](#)

Ke, F., Yan, J., Roc, M., Niu, S., Wolf, N., **Yang, H.**, Yin, K., Wen, J., Lee, Y., Karunadasa, H., Mao, W.L., Lin, Y., 2022. Quasi-one-dimensional metallicity in compressed CsSnI<sub>3</sub>. *Journal of the American Chemical Society*. <https://doi.org/10.1021/jacs.2c10884>

Ke, F., Yan, J., Niu, S., Wen, J., Yin, K., **Yang, H.**, Wolf, N., Tzeng, Y.-K., Karunadasa H., Lee, Y., Mao, W.L., Lin, Y., 2022. Cesium-mediated electron redistribution and electron-electron interaction in high-pressure metallic CsPbI<sub>3</sub>. *Nature Communications* 13, 7067. <https://doi.org/10.1038/s41467-022-34786-5>

Frost, M., Lazarz, J.D., Levitan, A.L., Prakapenka, V.B., Sun, P., Tkachev, S.N., **Yang, H.**, Glenzer, S.H., Gleason, A.E., 2021. High Pressure Brillouin Spectroscopy and X-ray Diffraction of Cerium Dioxide. *Materials* 14, 3683. <https://doi.org/10.3390/ma14133683>

**Yang, H.**, Gleason, A.E., Tkachev, S.N., Chen, B., Jeanloz, R., Mao, W.L., 2021. Noble gas incorporation into silicate glasses: implications for planetary volatile storage. *Geochemical Perspectives Letters* 17, 1–5. <https://doi.org/10.7185/geochemlet.2105>

Wang, W., Liu, J., **Yang, H.**, Dorfman, S.M., Lv, M., Li, J., Zhu, F., Zhao, J., Hu, M.Y., Bi, W., Alp, E.E., Xiao, Y., Wu, Z., Lin, J.-F., 2021. Iron force constants of bridgmanite at high pressure: Implications for iron isotope fractionation in the deep mantle. *Geochimica et Cosmochimica Acta* 294, 215–231. <https://doi.org/10.1016/j.gca.2020.11.025>

Liu, J., Wang, W., **Yang, H.**, Wu, Z., Hu, M., Zhao, J., Bi, W., Alp, E.E., Dauphas, N., Liang, W., Chen, B., Lin, J.-F., 2019. Carbon isotopic signatures of super-deep diamonds mediated by iron redox chemistry. *Geochemical Perspectives Letters*, 10, 51-55. <https://doi.org/10.7185/geochemlet.1915>

**Yang, H.**, Lin, J.-F., Hu, M.Y., Roskosz, M., Bi, W., Zhao, J., Alp, E.E., Liu, J., Liu, Jiachao, Wentzowitch, R.M., Okuchi, T., Dauphas, N., 2019. Iron isotopic fractionation in mineral phases from Earth's lower mantle: Did terrestrial magma ocean crystallization fractionate iron isotopes? *Earth and Planetary Science Letters* 506, 113-122. <https://doi.org/10.1016/j.epsl.2018.10.034>

Liu, J., Dauphas, N., Roskosz, M., Hu, M.Y., **Yang, H.**, Bi, W., Zhao, J., Alp, E.E., Hu, J.Y., Lin, J.-F., 2017. Iron isotopic fractionation between silicate mantle and metallic core at high pressure. *Nature Communications* 8, 14377. <http://dx.doi.org/10.1038/ncomms14377>

## CONFERENCES & WORKSHOPS

**Yang, H.**, Matteucci, J., Xu, H., Navrotsky, A. Raman Study of solid and liquid CeCl<sub>3</sub> for a carbon free energy

solution. *2024 Arizona Postdoctoral Research Conference*, University of Arizona, Tucson, Arizona, USA (2024).

**Yang, H.**, Tikoo, S. M., Carvalho, C., Bilardello, D., Solheid, P., Gaastra, K. M., Sager, W. W., Thoram, S., Hoernle, K., Höfig, T. W., IODP 391 Scientists. Characterization of magnetic mineralogy using amplitude dependence of magnetic susceptibility. Invited talk, *International Ocean Discovery Program 391/397T Post-cruise Meeting*, La Palma, Spain (2024)

Gaastra, K., Thoram, S., Sager, W., Carvalho, C., Tikoo, S. M., **Yang, H.**, IODP 391 Scientists. Aleolatitude of the Tristan/Gough Hotspot: Implications for Paleocene True Polar Wander and Hotspot Motion. *IODP 391/397T Postcruise Meeting*, La Palma, Spain (2024)

Tikoo, S., **Yang, H.**, Sager, W., Thoram, S., Gaastra, K., Carvalho, C., Hatfield, R., Avery, A., del Gaudio, A. Paleomagnetism of Sites U1576, U1577, and U1585 sediments. *International Ocean Discovery Program 391/397T Post-cruise meeting*, La Palma, Spain (2024)

**Yang, H.**, Armstrong, M., Radousky, H., Austin, R., Gong, Z., Wei, T., Mao, W., Goncharov, A., Gleason, A., Ultrafast observation of temperature in laser-shocked Al and Zr (Oral, with student travel award), *American Physical Society GSCCM* (2023)

**Yang, H.**, Niu, S., Park, S., Chariton, S., Prakapenka, V.B., Mao, W.L., Reactions between Mn and water at high pressure: could giant impacts on Mars produce MnO<sub>2</sub>? (Oral), *AGU fall meeting Abstracts* (2022)

Gu, J., Peng, B., Zhang, J., Ji, X., **Yang, H.**, Hoyos, S., Hirschmann, M., Kite, E., Earth's Earliest Atmosphere and Volatile Loss During Accretion (Oral), *AGU fall meeting Abstracts* (2022)

CIDER 2022 Summer Program: Earth's evolution as an inhabited world, Berkeley, CA, USA (with student travel award)  
Group Project: Earth's earliest atmosphere and volatile loss during accretion

Pandolfi, S., **Yang, H.**, Ricks, M., Park, S., Chariton, S., Prakapenka, V.B., Mao, W.L., Gleason, A.E., *In situ* study of SiO<sub>2</sub> deformation and phase transitions on the millisecond timescales using a dynamic diamond anvil cell, *AGU fall meeting Abstracts* (2021)

**Yang, H.**, Wang, W., Mao, W.L., Valence state of iron in iron alloys under high pressure: implications for Earth and planetary cores, *AGU fall meeting Abstracts* (2019)

**Yang, H.**, Shear wave velocity of iron under Earth's core conditions: Constraints from shock compression (Contributed talk), COMPRES annual meeting, Big Sky, Montana, USA, 2019

**Yang, H.**, Lin, J.-F., Hu, M.Y., Roskosz, M., Bi, W., Zhao, J., Alp, E.E., Liu, Jin, Liu, Jiachao, Wentzowitch, R.M., Okuchi, T., Dauphas, N., Iron Isotopic Fractionation in Earth's Lower Mantle (Oral), *AGU fall meeting Abstracts* (2018)

**Yang, H.**, Lin, J.-F., Dauphas, N., Bi, W., Zhao, J., Isotopically Heavy Low-Spin iron in Ferropericlase at Core-Mantle Boundary, *AGU fall meeting Abstracts* (2016)

Deep Volatiles, Energy & Environments Summit, Shanghai, China, 2018

HYU-HPSTAR-CIS workshop, Jeju, South Korea, 2017 (Travel grant awarded)

Workshop on Nuclear Resonant Scattering and Data Analysis, Advanced Photon Source, Lemont, Illinois, USA, 2016 (Travel grant awarded)

High-Pressure Crystallography: Status Artis and Emerging Opportunities, Erice, Italy, 2016 (Travel grant awarded)