

Jung-Fu “Afu” Lin

Curriculum Vitae and List of Publications

Department of Geological Sciences, Jackson School of Geosciences

The University of Texas at Austin

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Education

- 2002 Ph.D. Geophysical Sciences, The University of Chicago, Chicago, Illinois, USA
1994 M.S. Earth Sciences, National Cheng-Kung University, Taiwan
1992 B.S. Earth Sciences, National Cheng-Kung University, Taiwan

Primary Positions Held

- 09/2019-current **Professor**, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin
09/2013-08/2019 **Associate Professor**, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin
07/2008-08/2013 **Assistant Professor**, Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin
07/2005-06/2008 **Lawrence Livermore Fellow**, Lawrence Livermore National Laboratory
07/2003-06/2005 **Research Scientist**, Carnegie-DOE Alliance Center (CDAC), Carnegie Institution for Science
07/2002-06/2003 **Carnegie Postdoctoral Fellow**, Geophysical Laboratory, Carnegie Institution for Science

Other Affiliations

- 07/2020-09/2020 **Visiting Professor**, Institute of Earth Sciences, Academia Sinica, Taiwan
09/2016-current **Affiliated Faculty**, Materials Science and Engineering (MS&E) Graduate Programs, The University of Texas at Austin
09/2013-current **Affiliated Faculty**, Texas Materials Institute, The University of Texas at Austin
07/2012-08/2020 **Visiting Professor/Scientist**, Institute for Planetary Materials, Okayama University at Misasa
06/2019-07/2019 **Visiting Professor**, Guiyang Institute of Geochemistry, Chinese Academy of Science
06/2017-08/2019 **Lecturer (summer short course)**, Department of Earth Sciences, National Cheng-Kung University, Taiwan
05/2014-08/2018 **Visiting Scientist**, Center for High Pressure Science and Technology Advanced Research (HPSTAR), Shanghai, China
07/1997-06/2002 **Research and Teaching Assistant**, Department of Geophysical Sciences, The University of Chicago

07/1996-06/1997 **Research Assistant**, Inst. of Earth Sciences, Academia Sinica, Taiwan
09/1992-06/1994 **Research and Teaching Assistant**, Department of Earth Sciences,
National Cheng-Kung University, Taiwan

Memberships in Professional Societies

AIRAPT, 2015-current
COMPRES, 2008-current
American Geophysical Union, 1997-current
American Institute of Physics, 1997-current
Mineralogical Society of America, 1997-current
Honor Member of Phi Tao Phi Society, Taiwan, 1993

Graduate Students Supervised

13. Yanyao Zhang, PhD student in Geological Sciences (Primary supervisor)
Period: 08/2017-current
Project: Elasticity of stishovite in the subducting slabs of the lower mantle
12. Raul Montano, PhD degree in Department of Mechanical Engineering (Co-Supervisor;
Primary supervisor: Y. Wang)
Period: 08/2019-current
Project: Strain Tuning of Thermal Properties of Two-Dimensional Materials
11. Suyu Fu, PhD student in Geological Sciences (Primary supervisor)
Period: 08/2014-current
Project: Elasticity of Earth's lower mantle minerals
10. Rusty Roberts, Master's degree in MS&E Program (Co-Supervisor; Primary supervisor: D. Akinwande)
Period: 08/2016-08/2019
Project: Properties of 2D materials under compressive strain
9. Xianghai Meng, PhD degree in Department of Mechanical Engineering (Co-Supervisor;
Primary supervisor: Y. Wang)
Period: 08/2015-12/2019
Project: Strain Tuning of Thermal, Electrical and Optical Properties of Transition Metal Dichalcogenides
8. Skyler Tong, Masters student in Geological Sciences (Co-Supervisor: Primary supervisor: P. Flemings)
Period: 08/2016-current
Project: Characterization of the physics and chemistry of methane hydrates in the Gulf of Mexico
7. Jason Kim, PhD degree in Electrical Engineering (Co-Supervisor; Primary supervisor: D. Akinwande)
Period: 06/2014-08/2018 (now a postdoc fellow at Northwestern University)
Project: Optoelectronic, Structural, and Topological Properties of van der Waals Layered Materials Under Extreme Conditions
6. Sean Grant, PhD student in Physics Department (Co-Supervisor; Primary supervisor: T. Ditemire)
Period: 08/2014-current

- Project: Electrical conductivity and equation of state and iron in the Earth's core investigated using Z Machine
5. Avinash Nayak, PhD degree in Electrical Engineering (Co-Supervisor; Primary supervisor: D. Akinwande)
Period: 08/2012-05/2015 (now working at AMD)
Project: Pressure Induced Structure-Property Tuning of Two Dimensional Materials
 4. Dennis Tong, master student in Department of Geological Sciences (Primary supervisor)
Period: 08/2012-06/2014 (now a PhD student at UT Austin)
Research Title: Transport properties of mantle minerals
 3. Jin "Jeff" Liu, PhD Degree in Department of Geological Sciences (Primary supervisor)
Period: 07/2010-05/2015 (now a staff scientist at HPSTAR, China)
Dissertation Title: The role of iron in the Earth's Interior
 2. Jing "Jill" Yang, PhD student in Department of Geological Sciences (Primary supervisor)
Period: 07/2011-05/ 2017 (now a postdoc at Geophysical Lab with Dr. Y. Fei)
Research Title: Elasticity of mantle minerals at high pressures and temperatures
 1. Chang "James" Lu, Department of Geological Sciences (Primary supervisor)
Period: 07/2010-05/ 2012 (now a PhD student at UT Austin)
Project: Elasticity of pyrope in the upper mantle by Brillouin Light Scattering

Undergraduate Student Supervision and Service

- Jesse Gu, undergraduate research assistant (Primary supervisor, JSG Honors Program)
Period: 06/2017-current
Research Project: Vibrational properties of lower-mantle bridgmanite at high pressure
- Stephen Armstrong, undergraduate research assistant
Period: 06/2016-08/2017 (now a PhD student at Caltech)
Research Project: Transition metal dichalcogenides at high pressures
- Sam Moran, undergraduate research assistant
Period: 01/2014-08/2016 (now working in the industry)
Research Project: Transition metal dichalcogenides at high pressures
- Megan Matheney, undergraduate research assistant
Period: 01/2014-05/2016 (finished a Master's degree at University of Glasgow in 2017)
Research Project: CO₂-H₂O clathrate hydrate in extreme environments
- Laura Dafov, undergraduate research assistant
Period: 01/2014-05/2016 (now a PhD student at Stanford University)
Project: Earth materials for GEO416K
- Jennifer Beam, undergraduate research assistant
Period: 01/2014-05/2016 (now math2 teacher at Akins HS, Dallas)
Research Project: Methane clathrate hydrate in extreme environments
- Nikki Seymour, undergraduate research assistant
Period: 03/2012-05/2013 (now a PhD student at University of Colorado Boulder)
Project: Earth materials for GEO416K; elasticity of ferropericline in the lower mantle
- Caleb Jacobs, undergraduate research assistant
Period: 09/2009-05/2012 (now work for the energy industry)
Research Project: Raman study of ferromagnesite at high pressure
- Casey Corbin, Undergraduate Honors Thesis Committee 2010 (Supervisor: Bill Carlson)
- Casey Huff, Undergraduate Honors Thesis Committee 2009 (Supervisor: Jim Gardner)

Andrea Wheat, undergraduate research assistant

Period: 07/2011-02/2012 (now a PhD student in Education at UT Austin)

Research Project: Spin transition of iron in the Earth's lower mantle

Served as a faculty judge on Undergraduate Critical Thinking Contest in the Jackson School of Geosciences

Other Advising and Related Student Services

PhD Student Committee and Supervising Service:

Jihoon Jeong, PhD student in Department of Mechanical Engineering (Supervisor: Yaguo Wang)

Service: Member of the PhD Defense Committee (2012)

Scott Eckley, PhD student in Department of Geological Sciences (Supervisor: R. Ketcham)

Service: Member of the PhD Examination Committee (2019)

Justin Thompson, PhD student in Department of Geological Sciences (Supervisor: M. Young)

Service: Chair of the PhD Examination Committee (2019)

Chujie Liu, PhD student in Department of Geological Sciences (Supervisor: S. Grand)

Service: Member of the PhD Examination Committee (2017-current)

Sean Sullivan, PhD student in Department of Mechanical Engineering (Supervisor: L. Shi)

Service: Member of the PhD Examination Committee (2017-2019)

Cullen Kortyna, PhD student in Department of Geological Sciences (Supervisor: D. Stockli)

Service: Member of the PhD Examination Committee (2017)

Chang Lu, PhD student in Department of Geological Sciences (Supervisor: S. Grand)

Service: Member of the PhD Examination Committee (2012-09/2018)

Adam Goldsmith, PhD student in Department of Geological Sciences (Supervisor: D. Stockli)

Service: Member of the PhD Committee (2012-09/2018)

Peter Nelson, PhD student in Department of Geological Sciences (Supervisor: S. Grand)

Service: Member of the PhD Examination Committee (2015-current)

Ye Wu, Visiting PhD student from Peking University (Supervisor: Xiang Wu)

Service: Supervising research project on "elasticity of subducted slabs in the Earth's mantle" in 2014

Narangoo Purevjavyn, PhD student in Mineral Physics at Okayama University at Misasa (Supervisor: Takuo Okuchi)

Service: External committee member for the qualification (03/2014) and defense (01/2017).

Shu Huang, PhD in Mineral Physics at Florida International University (Supervisor: Jinhua Chen)

Service: external committee member for the qualification and defense (03/2014).

Jie Zhu, Visiting PhD student from Chinese Academy of Science (Supervisor: C. Jin)

Service: Supervising research project on "Energy Frontier Research in Extreme Environments" related to Lin's DOE grant (2012-2013)

Yu Xia, PhD student in Department of Geological Sciences (Supervisor: S. Grand)

Service: Member of the PhD Defense Examination Committee (2011-2012)

Yang Wang, PhD student in Department of Geological Sciences (Supervisor: S. Grand)

Service: Member of the PhD Defense Examination Committee (2010-2012)

Meijuan Jiang, Department of Geological Sciences (Supervisor: K. Spikes)

Service: External member of the Qualification Examination Committee in 2011

Yao You, Department of Geological Sciences (Supervisor: D. Mohrig)

Service: External member of the Qualification Examination Committee in 2009
Stephanie Moore, Department of Geological Sciences (Supervisor: W. Carlson)
Service: External member of the Qualification Examination Committee in 2009
Dan Birt, Department of Physics (Supervisor: E. Li)
Service: Member of the Qualification Examination Committee in 2010
Junjie “JJ” Wu, Visiting PhD student from Chinese Academy of Science (Supervisor: C. Jin)
Service: Supervising research project on “Energy Frontier Research in Extreme Environments” related to Lin’s DOE grant in 07/2010-2013

Postdoctoral Fellows and Visiting Scholar Supervised

11. Dr. Wen Liang (Associate Research fellow in Geochemistry, Chinese Academy of Sciences, China, 2009)
Period: 2/1/2019-1/31/2020
Research Project: Deep-Earth mineral physics
His visit to Dr. Lin’s lab is sponsored by the International Exchange Scholarship Program of China for one year.
10. Dr. Seyedalireza Khatibi (PhD in Petroleum Engineering, University of North Dakota, USA, 2015)
Period: 09/2019-12/2019
Dr. Khatibi works on characterizations of methane hydrates from the Gulf of Mexico
9. Dr. Jiachao Liu (PhD in Geophysics, University of Michigan at Ann Arbor, USA, 2015)
Period: 5/2017-05/2019
Dr. Liu works on mineral physics and methane hydrates in extreme environments.
8. Dr. Youjun Zhang (PhD in Geophysics, University of Hiroshima, Japan, 2015)
Period: 11/2015-02/2017 (now an associate professor at Sichuan University)
Dr. Zhang works on properties of iron alloys in the Earth’s core.
7. Dr. Junjie Wu (PhD in Physics, Chinese Academy of Sciences, China, 2014)
Period: 3/2014-2/2015 (now works for the industry)
Dr. Wu worked on iron-based superconductors at extreme environments.
6. Dr. Maoshuang Song (Visiting Professor from the Institute of Geochemistry, Chinese Academy of Sciences)
Period: 1/1/2014-12/31/2014
Dr. Song’s visit to Dr. Lin’s lab is sponsored by the Chinese Academy of Sciences.
5. Dr. Xiang Wu (Visiting Professor from Peiking University)
Period: 2/1/2013-7/31/2013 (now a professor at China University of Geology at Wuhan)
Professor Wu was a visiting scholar to Dr. Lin’s lab sponsored by the EFree project.
4. Dr. Shaomin Feng (PhD in Physics, Chinese Academy of Sciences)
Period: 10/13/2012-12/20/2012
Dr. Feng is an assistant research fellow at the Institute of Physics, Chinese Academy of Sciences. His visit to Dr. Lin’s lab is sponsored by the Chinese Academy of Sciences.
3. Dr. Dawei Fan (Research fellow in Geochemistry, Chinese Academy of Sciences, China, 2009)
Period: 8/25/2012-8/24/2013; 01/01/2018-12/31/2018
Research Project: Deep-Earth mineral physics

Dr. Fan is an associate research fellow at the Institute of Geochemistry, Chinese Academy of Sciences. His visit to Dr. Lin's lab is sponsored by the International Exchange Scholarship Program of China for one year.

2. Dr. Gopal Pradhan (PhD in Physics, JNCASR, India, 2010)

Period: 7/1/2010-12/2010

Research Project: Energy Frontier Research in Extreme Environments

1. Dr. Zhu Mao (PhD in Geophysics, Princeton University, USA, 2009)

Period: 8/1/2009-7/31/2010 & 06/01/2011-03/2013

Research Project: Deep-Earth mineral physics

Dr. Mao is now a professor at the University of Science and Technology in China (USTC) as part of the Youth Project of the Recruitment Program of Global Experts in China.

Synergistic Activities

- 2019 Geophysics Faculty Search Committee, Department of Geological Sciences
- 2019, 2020 Member of LDE Faculty Annual Evaluation Committee, UT Austin
- 2019 Convener, Goldschmidt Meeting 2019, Deep Volatiles Session
- 2018 Earth Sciences Proposal Review Panel for Geophysics, NSF
- 2018-2019 Lecturer for Summer Short Course at National Cheng-Kung University (How to build a habitable planet?), Tainan, Taiwan
- 2018 Lecturer for High-School Science Course (2 days) for Gifted and Talent Program at Tainan First Boys and Girls High Schools, Tainan, Taiwan
- 2017-2020 Guest Editor, Carbon in Earth's Interior, AGU Monography Series (co-editors: Craig Manning and Wendy Mao)
- 2017 Convener, American Geophysical Union Fall Meeting, Deep Carbon session
- 2017 Faculty Search Committee, Lithosphere Dynamics, UT Austin
- 2017 Convener, Goldschmidt Meeting, Paris, Deep Carbon session
- 2017-2019 Chair of the External Awards Committee, Department of Geological Sciences, University of Texas at Austin
- 2017-current Member, DeFord Lecture Seminar Committee, Department of Geological Sciences, University of Texas at Austin
- 2016-2019 Engagement Advisory Committee, Deep Carbon Observatory, Sloan Foundation
- 2015-current Editor, Nature Scientific Reports
- 2015 Strategic Planning Committee, Department of Geological Sciences
- 2015 Faculty Search Committee, Geophysics
- 2014 Faculty Search Committee, Petrology
- 2012-2016 Discipline Group Leader, Petrology and Mineral Physics, Department of Geological Sciences, The University of Texas at Austin
- 2012 Convener, Fall AGU session: "Electronic structure and elasticity of deep Earth minerals"
- 2012-2015 Facilities Committee Member, COMPRES
- 2012-2013 Visiting scientist, High Pressure Synergetic Consortium at the Advanced Photon Source (HPSynC), Argonne National Laboratory
- 2012-2017 Academic member, Texas Center for High Intensity Laser Science, The University of Texas at Austin

2012-2015 Academic partner, Instrument Development Team of the Spallation Neutrons and Pressure Diffractometer (SNAP), Oakridge National Laboratory

2010-2019 Lecturer for UTeach Outreach Program participants, The University of Texas at Austin

2011-2013 Panel member, General User Proposal Review Panel, Advanced Photon Source, Argonne National Laboratory

2011-2013 Coordinator, Departmental Technical Sessions Seminar, Department of Geological Sciences, The University of Texas at Austin

2011 Convener, Fall AGU special session “MR11: Physical and Chemical States of the Earth”

2011 Local Organizer, Workshop on “Dynamic Phenomena under Extreme Environments” at University of Texas at Austin in Jan. 24-28th, 2011.

2010 Committee Member, Departmental Tech Session Seminar, Department of Geological Sciences, The University of Texas at Austin

2010-2014 Academic partner, Center for Energy Frontier Research in Extreme Environments (EFree), Energy Frontier Research Centers of the DOE

2009-2014 Academic partner, Carnegie/DOE Alliance Center (CDAC): A Center of Excellence for High Pressure Science and Technology, Energy Frontier Research Centers of the DOE

2010-2012 Member, Editorial Advisory Board, EoS Transactions of the American Geophysical Union (The Newspaper of the Earth and Space Sciences)

2004-2012 Member, Executive Committee of Mineral and Rock Physics American Geophysical Union

2008-current Elector to COMPRES, University of Texas at Austin

2008 Convener, Fall AGU special session “DI08 Chemical Heterogeneities in the Earth’s Mantle: Their Roles in the Early Earth Differentiation, Mantle Dynamics and Geochemistry”

2004-2008 Selection Committee, Student Presentation Award, American Geophysical Union

2007-2008 Guest Editor, Physics of the Earth and Planetary Interiors, Special Issue: *Frontiers and Grand Challenges in Mineral Physics of the Deep Mantle*

2007 Convener, Fall AGU special session “*Behavior of Iron in the Deep Earth and New Views of the Mantle and Core*” and “*Structures and Properties of Earth’s Interior Probed Using Advanced Radiation, Laboratory Tools and Seismic Waves*”

2006 Convener, Fall AGU special session “*Composition and Dynamics of Earth’s Mantle: Current Frontiers and Grand Challenges in Elasticity, Phase Transitions, and Rheology Studies*”

2005 Convener, AGU special session “*Behavior and Consequences of Iron in the Earth’s Mantle*”

Reviewer Nature, Science, Nature Geoscience, Nature Communications, Science Advances, Scientific Reports, Physical Review Letters, Physical Review B, National Science Foundation (Geophysics/Petrology, Instrumentation and Facility, Postdoc Fellowship, CSEDI), NERC (National Environment Research Council of UK), Department of Energy (Basic Energy Science), Advanced Science, U.S. Civilian Research & Development Foundation (CRDF), Deutsche Forschungsgemeinschaft (DFG) German Research Foundation, Petroleum

Research Fund of the American Chemical Society, Advanced Light Source, Geophysical Research Letters, Journal of the Geophysical Research-Solid Earth, American Mineralogist, Applied Physics Letters, Physics of the Earth and Planetary Interiors, Earth and Planetary Science Letters, Journal of Chemical Physics, The Journal of Physical Chemistry, Journal of Physics: Condensed Matters, Nanoscale Advances, Proc. Natl. Acad. Sci. USA, Journal of Applied Physics, Journal of Physics and Chemistry of Solids, Mineralogy and Petrology, 2D Materials, American Geophysical Union Monograph, Chemical Engineering Science, Swiss National Science Foundation, Angewandte Chemie

Active Collaborators in the Last 3 Years

UT Austin Collaborators

Prof. Deji Akinwande (Professor in the Department of Electrical Engineering; 2D materials)
Dr. Aaron Bernstein (Research scientist in Department of Physics; shock wave experiments on iron alloys at Sandia National Lab)
Dr. Nick Dygert (Postdoc in Geological Sciences (now an assistant professor at U. Tennessee at Knoxville); Lunar interior)
Prof. Hugh Daigle (Associate Professor in Petroleum Engineering; Methane hydrate projects funded by DOE and ExxonMobil)
Prof. Peter Flemings (Professor in Geological Sciences; Methane hydrate projects funded by DOE and ExxonMobil)
Prof. James Gardner (Professor in Geological Sciences; Acquisition of piston-cylinder apparatus from NSF Instrumentation and Facility; water in igneous melts)
Prof. Steve Grand (Professor in Geological Sciences; Deep-Earth geophysics)
Prof. Elaine Li (Professor in Department of Physics; 2D materials)
Prof. Li Shi (Professor in Department of Mechanical Engineering; Aperiodic materials; Energy Frontier Research Centers)
Prof. Danny Stockli/Adam Goldsmith (Professor/PhD student in Geological Sciences; Raman study of radiation-damaged zircon)
Prof. Yaguo Wang (Assistant Professor in Department of Mechanical Engineering; 2D materials, ultrafast laser spectroscopy, superconductivity in hydrides)
Dr. Kehua You (research associate in Institute for Geophysics; Methane hydrate projects funded by DOE and ExxonMobil)
Dr. Jianshi Zhou (Research Professor in Texas Materials Institute; superconducting hydrides at extremes)

Direct Collaborators at Other Institutions

Ercan E. Alp (Argonne National Lab), Kenny Befus (Baylor University), Paul Chow (Carnegie Institution), Nicolas Dauphas (University of Chicago), Fredric Deschamps (Academia Sinica), Przemek Dera (University of Chicago), Leonid Dubrovinsky (Universität Bayreuth), Nick Dygert (University of Tennessee), Alexander G. Gavriliuk (Russian Academy of Sciences), Alex Goncharov (Carnegie Institution), Ross Howe (HPSTAR), Wen-Pin Hsieh (Academia Sinica), Steven Jacobsen (Northwestern University), Changqing Jin (Chinese Academy of Sciences), Shun-ichiro Karato (Yale University), Tianshu Li (George Washington University), Jin Liu (Stanford University), Sergey Lobanov (GFZ Potsdam), Zhu Mao (USTC), Catherine McCammon (BGI), Dane Morgan (University of Wisconsin at Madison), Takuo Okuchi

(Okayama University at Misasa), Vitali Prakapenka (University of Chicago), Mathieu Roskosz (Muséum National d'Histoire Naturelle), Abhishek Singh (Indian Institute of Science), Sergio Speziale (GFZ Potsdam), Viktor Struzhkin (Carnegie Institution), György Vankó (KFKI, Hungary), Rudy Wenk (University of California at Berkeley), Xiang Wu (China University of Geology at Wuhan), Yuming Xiao (Carnegie Institution), Hitoshi Yamaoka (RIKEN SPring-8 Center), Wenge Yang (HPSync, Argonne National Lab), Renata Wentzcovitch (Columbia U), Takashi Yoshino (Okayama University at Misasa), Jiyong Zhao (Argonne National Lab)

List of Publications

Researcher ID: B-4917-2011

Google Scholar: <http://scholar.google.com/citations?user=EzOjD4gAAAAJ&hl=en>

ORCID: 0000-0002-0163-5329

Edited Volumes

J.F. Lin, S.-i. Karato, J. Bass, E. Ohtani, and C. Prewitt (Eds.), 2, Volume 170, Issues 3-4, pp. 151-282, *Phys. Earth Planet. Inter.*, 2008.
C. Manning, W. Mao, and **J.F. Lin**, Carbon in Earth's Interior, AGU Monograph Series 249, 384 pages, ISBN: 978-1-119-50826-7, 2020.

Journal and Book Chapter Publications

2020 (in submission/under review)

Zhang, Y., S. Fu, B. Wang, and **J.F. Lin**, Shear-Driven Ferroelastic Transition from Stishovite to Post-Stishovite at High Pressure, *Phys. Rev. Lett.* (under review), 2020.
Wang, W., J. Liu, H. Yang, S.M. Dorfman, M. Lv, J. Li, F. Zhu, J. Zhao, M.Y. Hu, W. Bi, E.E. Alp, Y. Xiao, Z. Wu, and **J.F. Lin**, Iron Force Constants of Bridgmanite at High Pressure: Implications for Iron Isotope Fractionation in the Deep Mantle, *Geochimica et Cosmochimica Acta* (in revision), 2020.
Zhou, Y., **J.F. Lin**, and Y. Wang, Stacking Order Driven Nonlinear Absorption in ReS₂, submitted to *ACS Photonics*, 2020.
Grant, S.C., T. Ao, D. H. Dolan, C. T. Seagle, A. J. Porwitzky, J.-P. Davis, K. R. Cochrane, **J.F. Lin**, T. Ditmire, and A. C. Bernstein, Single-Shot Ellipsometry Observations of Shock-Induced Birefringence in BK7 and LiF, in prep. for *Rev. Sci. Instrum.*, 2020.
Hsu, W.T., J. Quan, P.-J. Chen, W.-H. Chang, X. Li, **J.F. Lin**, and C.-K. Shih, Engineering K-valley couplings in transition metal dichalcogenides through controls of interlayer spacing, submitted to *Nature Physics*, 2020.
Liu, J., S. Merke, A. Alatas, W. Bi, and **J.F. Lin**, Compressional wave velocity anisotropy in textured hcp-Fe in Earth's core, submitted to *Geophys. Res. Lett.*, 2020.
Gu, J., S. Fu, J.E. Gardner, S. Yamashita, T. Okuchi, and **J.F. Lin**, Anomalous Elasticity of Anhydrous and Hydrous Rhyolitic Glasses up to 3 GPa, submitted to *Am. Miner.*, 2020.
Zhang, Y., S. Fu, F. Xu, T. Okuchi, and **J.F. Lin**, Elastic and Vibrational Properties of Al-bearing Stishovite and Post-Stishovite at High Pressure, in prep., 2020.
Fu, F., Y. Zhang, T. Okuchi, and **J.F. Lin**, Evidence for a Bridgmanite-Predominant Lower Mantle and Chemically Layered Mantle, in prep., 2020.
Sun, N., H. Bian, Y. Zhang, **J.F. Lin**, V.B. Prakapenka, and Z. Mao, High-Pressure

Experimental Study of Tetragonal CaSiO₃-Pervoskite to 200 GPa, *Am. Miner.*, submitted, 2020.

Grant, S.C., T. Ao, C.T. Seagle, A.J. Porwitzky, J.-P. Davis, K.R. Cochrane, D.H. Dolan, **J.F. Lin**, T. Ditmire, and A.C. Bernstein, Equation of State Measurements on Liquid Iron Along an Elevated Isentrope Across Planetary Core Conditions, submitted to *J. Geophys. Res.*, 2020.

Lobanov, S.S., F. Soubiran, N. Holtgrewe, J. Badro, **J.F. Lin**, and A.F. Goncharov, Opaque Lowermost Mantle, submitted to *Proc. Natl. Acad. Sci.*, 2020.

Lobanov, S.S., S. Speziale, **J.F. Lin**, and L. Schifferle, Systematic error in graybody temperature of nongray bridgmanite, in prep. for *J. Geophys. Res.*, 2020.

2020 (and articles in press)

194. Gu, J.T., S. Fu, J.E. Gardner, S. Yamashita, T. Okuchi, and **J.F. Lin**, Non-linear Effects of Hydration on Sound Velocities of Rhyolitic Glasses up to 3 GPa, *Am. Miner.*, <https://doi.org/10.2138/am-2021-7597>, 2020.

193. Zhang, Y., M. Hou, P. Driscoll, N.P. Salke, J. Liu, E. Greenberg, V.B. Prakapenka, and **J.F. Lin**, Transport properties of Fe-Ni-Si alloys at Earth's core conditions: Insight into the viability of thermal and compositional convection, *Earth Planet. Sci. Lett.*, 553, 116614, <https://doi.org/10.1016/j.epsl.2020.116614>, 2020.

192. Meng, X., A. Singh, R. Juneja, Y. Zhang, F. Tian, Z. Ren, A. Singh, L. Shi, **J.F. Lin**, Y. Wang, Pressure Dependent Behavior of Defect-modulated Band Structure in BAs, *Advanced Materials*, 2001942, <https://doi.org/10.1002/adma.202001942>, 2020.

191. Zhang, Y., M. Hou, G. Liu, C. Zhang, V.B. Prakapenka, E. Greenberg, Y. Fei, R.E. Cohen, and **J.F. Lin**, Reconciliation of experiments and theory on transport properties of iron and the geodynamo, *Phys. Rev. Lett.*, 125, 078501, DOI: 10.1103/PhysRevLett.125.078501, 2020.

190. Gao, J.-J., S.-Y. Fu, K. Yamaura, **J.F. Lin**, and J.-S. Zhou, Room-temperature polar metal phase of LiOsO₃ stabilized under high pressure, 101, 22010 (R), *Phys. Rev. B (Rapid Comm.)*, 2020.

189. Hsieh, W.-P., A.F. Goncharov, S. Labrosse, N. Holtgrewe, S.S. Lobanov, J. Badro, F. Deschamps, and **J.F. Lin**, Low thermal conductivity of iron-silicon alloys at Earth's core conditions: implications for the geodynamo, 11, 3332 | <https://doi.org/10.1038/s41467-020-17106>, *Nature Comm.*, 2020.

188. Zhou, Y., N. Maity, A. Rai, R. Juneja, X. Meng, A. Roy, **J.F. Lin**, S. Banerjee, A.K. Singh, Y. Wang, Stacking Order Driven Optical Properties and Carrier Dynamics in ReS₂, <https://doi.org/10.1002/adma.201908311>, *Advanced Materials*, 2020.

187. Lee, S.K., K.Y. Mun, Y.-H. Kim, J. Lhee, T. Okuchi, and **J.F. Lin**, The Degree of Permanent Densification in Oxide Glasses upon Extreme Compression up to 24 GPa at Room Temperature, 11, 8, 2917-2924, *The Journal of Physical Chemistry Letters*, 2020.

186. Salke, N.P., M.M.D. Esfahani, N. Yedukondalu, Y. Zhang, I.A. Kruglov, J. Zhou, E. Greenberg, V.B. Prakapenka, J. Liu, A.R. Oganov, and **J.F. Lin**, Prediction and synthesis of dysprosium hydride phases at high pressure, 59, 8, 5303–5312, *Inorganic Chemistry*, [10.1021/acs.inorgchem.9b03078](https://doi.org/10.1021/acs.inorgchem.9b03078), 2020.

185. Lobanov, S.S., N. Holtgrewe, G. Ito, J. Badro, H. Piet, F. Nabiei, **J.F. Lin**, L. Bayarjargal, R. Wirth, A. Schreiber, and A.F. Goncharov, Blocked radiative heat transport in the hot pyrolytic lower mantle, 537, 116176, <https://doi.org/10.1016/j.epsl.2020.116176>, *Earth*

Planet. Sci. Lett., 2020.

184. Liu, J., S. Fu, and **J.F. Lin**, Spin transition of iron in deep-mantle ferromagnetite, Chapter 12, 115-125, 12, in *Carbon in Earth's Interior*, AGU Monograph Series 249, 384 pp, ISBN: 978-1-119-50826-7, 2020.
183. Fan, D., S. Fu, C. Lu, J. Xu, Y. Zhang, S.N. Tkachev, V.B. Prakapenka, and **J.F. Lin**, Elasticity of single-crystal Fe-enriched diopside at high pressure conditions: Implications for the cause of upper mantle low-velocity zones, 104, 262-275, 10.2138/am-2020-7075, *Am. Miner.*, 2020.

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News/Newsletters

- J. F. Lin, Understanding electronic spin states of iron in the Earth's lower mantle, COMPRES Newsletter, Vol.5 No.3 and Vol.6 No.1, 1-3, January, 2007.

Scholarly Presentations and Meeting Organizations

- National Synchrotron Radiation Research Center**, Hsingchu, Taiwan (9/24/2020)
High-Pressure Single-Crystal Research: A User's Viewpoint
- National Tsinghua University**, Hsingchu, Taiwan (9/23/2020)
Exploring Condensed Matter Physics at Extreme Pressure
- National Cheng-Kung University**, Tainan, Taiwan (9/18/2020)
Evidence for a Chemically Layered Mantle
- National Central University**, Taoyun, Taiwan (9/15/2020)
Exploring Physics and Chemistry of Matter at Extremes
- Institute of Earth Sciences, Academia Sinica**, Taipei, Taiwan (9/10/2020)
Energy Sources Powering the Geodynamo
- American Geophysical Union Fall Meeting 2019**, New Orleans (12/2019; talk)
Water Concentration in Single-Crystal (Al,Fe)-bearing Bridgmanite and its Possible Implications for the Dehydration Melting below 660 km Depth
- Lamont-Doherty Earth Observatory**, Columbia University (11/2019) (Invited)
Evidence for a Chemically Layered Mantle
- Deep Carbon Observatory Meeting, Carnegie Institution for Science (10/2019)**
Water Transport across the Mantle Transition Zone and Lower Mantle Boundary
- AIRAPT Conference 2019**, Rio de Janeiro, Brazil (8/5/2019)
Electrical and thermal conductivities of Fe at Earth's core conditions: Insight into the thermal energy contribution to the evolution of the geodynamo
- Guiyang Institute of Geochemistry**, Chinese Academy of Sciences (08/2019) (Invited)
Lower-Mantle Mineralogy and Water/Iron Chemistry

Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (08/2019) (Invited)
 New Insights into Lower-Mantle Mineralogy and Water/Iron Chemistry

Okayama University at Misasa, Institute for Planetary Materials, Japan (5/9/2019; invited)
 Electrical and thermal conductivities of Fe in Earth's core: Insight into the thermal energy contribution to the evolution of the geodynamo

Joint symposium of Misasa 2019 and Core-Mantle Coevolution, Institute for Planetary Materials, Okayama University at Misasa, Japan (3/20/2019; invited)
 Internally-consistent multiple constraints on the mineralogy and seismology of Earth's lower mantle

Seoul National University, School of Earth and Environmental Sciences, Korea (01/2019; invited)
 Physical and chemical evolution of the Earth's deep interior

Goethe-Universitaet Frankfurt, CarboPaT Annual Meeting (10/2018; invited)
 Physics and chemistry of methane hydrate in the Gulf of Mexico

Universitaet Bayreuth, Bayerisches Geoinstitut (10/2018; invited)
 Iron partitioning and fractionation in the lower mantle

Deutsches GeoForschungsZentrum (GFZ), Helmholtz-Zentrum Potsdam (09/2018)
 Unusual Physics and Chemistry of the Lower Mantle

Exploring the Interiors of Exoplanets Workshop, University of Science and Technology in China, Hefei, China (08/2018; invited)
 New Frontier in Exploring Exoplanetary Interiors: Opportunities and Challenges

Sichuan University, The Institute of Atomic and Molecular Physics, China (8/15/2018)
 Mineral Physics and High Pressure Techniques

High-Pressure Equation of State and Phase Transition Workshop, Chinese Academy of Engineering Physics, China (5/25/2018)
 Hot Dense Iron: from Earth's Core to Super-Earths' Interiors

American Geophysical Union Fall Meeting 2017, New Orleans (12/2017; invited)
 Elasticity of the Earth's Lower Mantle Minerals at High Pressures: Implications to Understanding Seismic Observations of the Deep Mantle

Goldschmidt Conference 2017, Paris, France (8/17/2017)
 Velocity Profiles and Deformation of Silicate Post-Perovskite in the Lowermost Mantle
 Iron isotopic fractionation in Earth's Lower Mantle and Core

AIRAPT Conference 2017, Beijing, China (8/19/2017)
 Revealing iron isotopic fractionation in Earth's lower mantle and core by inelastic x-ray scattering

Academia Sinica, Institute of Physics (8/1/2017; invited)
 Exploring Materials Properties at High Pressure

Z Fundamental Science Workshop, Albuquerque, New Mexico (7/17/2017)
 Melting and Thermal Conductivity of Iron in the Earth's Core

Nanjing University, School of Earth Sciences and School of Physics (7/14/2017)
 A New Spin on the Physics and Chemistry of the Earth's Deep Mantle
 Tuning 2D Material Properties by Compressive Strain

Argonne National Laboratory, Physics Division Colloquium (05/19/2017; invited)
 Revealing Physical and Chemical Nature of Earth's deep Iron by Inelastic X-ray Scattering

University of Texas at Austin, Undergraduate Geology Society (4/19/2017)
 An Earth Scientist's Journey to Earth's Deep Interior

Goldschmidt Conference 2017, Paris, France (8/2017)
 Deep Carbon (co-organizer)

Deep Carbon Observatory International Science Meeting, St. Andrew University (3/2017)
 Characterization of methane hydrate reservoirs in the Gulf of Mexico

American Geophysical Union Fall Meeting 2016, San Francisco (12/2016)
 Viscosity of a late lunar magma ocean liquid: Implications for the purity of ferroan anorthosites (co-authored with Nick Dygert et al.)

Deep Carbon Observatory Workshop, Stanford University (12/2016)
 Thermal and Electrical Conductivity of Fe-C Alloy in the Earth's Core

Jilin University, National Laboratory for Superhard Materials, Jilin University, China (9/29/16)
 Tuning 2D Material Properties by Compressive Strain

Seoul National University, School of Earth and Environmental Sciences, Korea (09/27/2016)
 Deciphering the Physics and Chemistry of Planetary Interiors

International Union of Crystallography (IUCr), Advanced Crystallography at High Pressure in Pohang, Korea (09/21/2016; invited)
 Exploring 2D Material Properties in Extreme Environments

X-ray Echo Spectroscopy, Argonne National Laboratory, Advanced Photon Source (APS), Chicago, (07/10/2016; invited)
 Understanding the physics and chemistry of earth materials in extreme environments by IXS

The 18th Chinese High Pressure Meeting, Chengdu, China (7/2016)
 Deciphering the Geophysics and Geochemistry of the Earth's Interior

The Xinjiang Technical Institute of Physics and Chemistry, Urumuqi, China (7/7/2016)
 Exploring 2D Materials Properties in Extreme Environments

Goldschmidt Conference 2016, Yokohama, Japan (6/2016)
 Elasticity and Phase Transitions of the Deep Mantle Ferromagnesite (Mg,Fe)CO₃

Taiwan Geological Society Annual Meeting, Taipei (5/17/2016)
 Deciphering the Enigma of the Earth's Interior

National Cheng-Kung University, Tainan, Taiwan (5/13/2016)
 A New Spin on the Physics and Chemistry of the Earth's Deep Mantle

Sandia National Laboratory, New Mexico (4/7/2016)
 Deciphering the Enigma of the Earth's Core

MISASA VI: Frontiers in Earth and Planetary Materials Research: Origin, Evolution and Dynamics, Institute for Study of Earth's Interior, Okayama University at Misasa, Japan (3/10/2016)
 Deciphering Chemical and Seismic Heterogeneities of the Earth's Deep Mantle

University of Texas at Austin, Planetary Organization for Space and Science Exploration (POSSE) (2/21/2016)
 Exploring Planetary Interiors at Extreme Conditions

National Synchrotron Radiation Research Center, Taiwan (12/23/2015)
 2D Materials in Extreme Environments

Synthesis Workshop of the Deep Carbon Observatory, U. Rhode Island (10/2015)
 Extreme Physics and Chemistry of Deep Carbon in the Earth

Institute of Geochemistry at Guiyang, Chinese Academy of Sciences, China (08/2015)
 Deciphering the Mineralogy and Seismology of the Earth's Mantle

Northwestern Polytechnical University, China (08/2015)
 Exploring 2D Materials Properties in Extremes

Annual Meeting of the Chinese Postdocs, China (8/2015) (Invited Plenary Talk)
Recent Advances in High-Pressure Physics

Zhengzhou University of Light Industry, Zhengzhou, China (07/2015)
Exploring 2D Material Properties in Extremes (Invited)

China University of Geology at Wuhan, China (06/2015)
A New Spin on Physics and Chemistry of the Earth's Deep Mantle
Deciphering the Enigma of the Earth's Core using Mineral Physics Data

High-Pressure Science & Advanced Technology for Research (HPSTAR), China (6/2015)
Deep Earth and Extreme Physics

Huazhong University of Science and Technology, Wuhan, China (06/2015)
Exploring 2D Material Properties in Extremes (Invited)

Japan Geoscience Union (JpGU) Annual Meeting, Makuhari, Japan (05/2015)
Recent Advanced in Understanding the Elasticity of the Lower Mantle (Invited)
Ferromagnesite as a Potential Deep-Mantle Carbon Carrier

APS User Workshop, Argonne National Laboratory (05/2015)
High-Pressure Acoustic Phonons and Elasticity of Iron Alloys and Oxides (Invited)

Deep Carbon Observatory (DCO) Science Meeting, Munich, Germany (03/2015)
Ferromagnesite in the Earth's Deep Mantle
Thermodynamics of planetary ices in extreme conditions of icy satellites
Physics of monolayer and bilayer graphene under hydrostatic pressure

Study of Matter at Extreme Conditions (SMEC), Florida (03/2005; invited)
Abnormal Elastic and Vibrational Behaviors of Magnetite at High Pressures
High-Pressure Properties of Transition Metal Dichalcogenides (TMDs)
Elasticity of the Earth's Mantle Minerals at High Pressure and Temperature

2D van der Waals Materials Workshop, The University of Texas at Austin (01/2015)
Physical Properties of 2D Materials in Extreme Environments (Invited)

Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (01/2015) (Invited)
Geophysical and Geochemical Consequences of the Spin Transition in Earth's Deep Mantle
Understanding the Physics and Chemistry of the Earth's Core

The 7th North America Mössbauer Symposium, Northeastern University (01/2015) (Invited;
Co-organizer)
Transition Metal Compounds in Extreme Environments

Geophysical Laboratory, Carnegie Institution for Science (1/2015) (Invited, Lab Seminar Series)
Geophysical and Geochemical Consequences of the Spin Transition in Earth's Deep Mantle

American Geophysical Union Fall Meeting 2014, San Francisco (12/2014)
Electronic Spin States of Iron in Phase D and NAL Phase at High Pressures (Oral, Contributed)

Ulsan National Institute of Science and Technology, Multidimensional Carbon Center, Ulsan, South Korea (11/2014)
Exploring Materials Properties at Extreme Environments

University of Michigan at Ann Arbor, Department of Earth and Environmental Sciences, (10/2014) (William T. Smith Lecture Series)
Undergraduate

The 17th Chinese High Pressure Meeting, Yangzhou, China (9/2014) (Invited Plenary Talk)
Recent Advances in Understanding Elasticity of the Earth's Mantle and Core

Annual Meeting of the Chinese Academy of Mechanical Physics, Mianyang, China (8/2014)
 (Invited Plenary Talk)
 Exploring Frontier Material Properties in Extreme Pressure and Temperature:
 Current States and Future Directions in High-Pressure Research

International Union of Crystallography Workshop in Beijing (8/2014) (Invited)
 Transition Metal Compounds in Extreme Environments

Lawrence Fellow Workshop, Lawrence Livermore National Laboratory (8/2014) (Invited)
 Transition Metal Compounds in Extreme Environments

High-Pressure Science & Advanced Technology for Research (HPSTAR), Summer Camp
 Program, Shanghai, China (7/2014)
 Using Mineral Physics Experiments to Understand the Earth's Deep Interior (Invited)

Chinese Academy of Sciences, Institute of Solid State Physics, Hefei, China (7/2014) (Invited)
 Transition Metal Compounds in Extreme Environments

University of Science and Technology of China, Hefei, China (7/2014) (Invited)
 Recent Advances in Understanding Seismic Velocities of the Earth's Interior (at School of
 Earth and Space Science)
 Transition Metal Compounds in Extreme Environments (at Hefei National Laboratory for
 Physical Sciences at the Microscale)

Elastic Properties of Iron in Extreme Conditions via X-ray Scattering Workshop, Japan
 (02/2014)
 Elasticity of Polycrystalline and Single-Crystal Iron Alloys in the Earth's Core (Invited)

Los Alamos National Laboratory, LANSCE School on Neutron Scattering, Los Alamos
 (1/2014)
 Mineral and Material Physics in Extreme Environments (Invited)

American Geophysical Union Fall Meeting 2013, San Francisco (12/2013)
 Iron Partitioning and Elasticity across the Spin Transitions of Iron in the Lower Mantle
 (Invited)

Deep Carbon Observatory Workshop, Stanford University (12/2013)
 Spin Transition of Iron in Ferromagnetite in the Earth's Mantle

Amherst College, Department of Physics, Seminar Series (10/2013)
 Solid State Geophysics under Extreme Environments: from Electronic Spin Transitions to
 Earth's Interior (Invited)

Inelastic X-ray Scattering Workshop at NSLS-II, Brookhaven National Lab (10/2013)
 Studying elasticity of materials in extreme environments using HERIX (Invited)

Goldschmidt Conference 2013, Florence, Italy (8/2013)
 Electronic Spin Transitions of Iron and Geoelectrons in Earth's Mantle (Invited)

Jilin University, National Laboratory for Superhard Materials, Jilin University, China (7/13)
 Using Advanced High-Pressure Techniques to Study Material Properties in Extreme
 Environments

High-Pressure Science & Advanced Technology for Research (HPSTAR), China (7/2013)
 A New Spin on Mineral Physics of the Earth's Mantle (Invited)
 Transition Metal Iron Compounds in Extreme Environments (Invited)
 Using Advanced High-Pressure Techniques to Study Earth's Deep Interior (Invited)

American Geophysical Union Fall Meeting 2012, San Francisco (12/2012)
 Sound Velocities of the Earth's Transition Zone Minerals (Invited)

Electronic spin transitions of iron in Earth's lower-mantle: potential implications to deep-mantle geophysics and geochemistry (Contributed)

National Synchrotron Radiation Research Center, Taiwan (11/27/2012; invited)

Synchrotron X-ray Spectroscopic Studies of Transition Metal Iron Compounds in Extreme Pressures and Temperatures

National Chiao-Tung University, Department of Physics, Taiwan (11/28/12; invited)

Studying Material Properties in a High-Pressure and Low-Temperature Diamond Anvil Cell

National Cheng-Kung University, Department of Earth Sciences, Taiwan (11/29/12; invited)

A New Spin on Mineral Physics of Earth's Mantle

High Pressure Interest Group Meeting, Advanced Photon Source (11/13/2012)

Transition Metal Iron Compounds in Extreme Pressures and Temperatures (Invited)

Institute for Study of Earth's Interior, Okayama University at Misasa, Japan (9/25/2012)

Sound Velocities of the Earth's Mantle Minerals: Constraining the Physics and Chemistry of the Earth's Interior

The 6th Asian Conference on High Pressure Research (ACHPR 6), Beijing, China

(8/12/2012)

Transition metal iron compounds in extreme environments

COMPRES Annual Meeting 2012, Lake Tahoe (7/2012)

Sound Velocities of Iron Alloys in Earth's Core

Superconductors and Strongly Correlated Materials, Energy Frontier Research in

Extreme Environments (EFree) Workshop, Geophysical Laboratory, Carnegie Institution of Washington, DC (4/21/2012)

Iron-based compounds in extreme environments

Dynamics and Evolution of the Earth's Interior: special emphasis on the role of fluids,

"Joint Symposium of Misasa-2012 and Geofluid-2", Okayama University at Misasa, Japan (3/18/2012)

Electronic spin transitions of iron in Earth's lower-mantle

Energy Frontier Research in Extreme Environments (EFree) Highlight Talk Series,

Geophysical Laboratory, Carnegie Institution of Washington, DC (1/11/2012)

Iron pnictide superconductors in extreme environments: The new iron era

American Geophysical Union Fall Meeting 2011, San Francisco (12/2011; invited)

Electronic spin and valence states of iron in lower-mantle silicate perovskite and post-perovskite

Chinese Academy of Science, Institute of High Energy Physics, Beijing Synchrotron Radiation Facility, Beijing (11/2011)

Synchrotron Inelastic X-ray Scattering at High Pressures: Probing Electronic, Magnetic, Elastic, and Phonon Properties

Dynamic Properties of Earth and Planetary Materials Workshop, CECAM (Centre

Européen de Calcul Atomique et Moléculaire), Lausanne, Switzerland (10/2011; invited)

Electronic and Elastic Properties of Iron-Containing Minerals in Earth's Interior

The 31st International Conference on the Applications of the Mössbauer Effect

(ICAME2011), Kobe, Japan (9/2011; invited speaker)

Electronic spin transition of iron in Earth's lower mantle

Energy Frontier Research in Extreme Environments (EFree) Annual Meeting,

Geophysical Laboratory, Carnegie Institution of Washington, DC (09/2011)

Efficient energy transportation and generation: iron pnictide superconductors in extreme environments

The Asia Oceania Geosciences Society (AOGS) Meeting, Taipei, Taiwan (08/2011; invited)

Elasticity of iron alloys in Earth's inner core

Electronic spin and valence states of iron in the Earth's lower mantle

APS User Meeting, Argonne National Laboratory, Advanced Photon Source (APS), Chicago (05/2011; invited)

Elasticity of iron alloys in Earth's inner core

Argonne National Laboratory, Advanced Photon Source (APS), Chicago, (03/2011; invited)

APS Upgrade Science Case: High-Energy Resolution Inelastic X-ray Scattering (HERIX)

Geophysical Laboratory, Carnegie Institution of Washington (01/2011; invited)

Transition metal iron compounds in extreme environments

Nassau-Argonne Mössbauer Symposium, New York (01/2011; invited keynote speaker)

Electronic spin transitions of iron in the Earth's deep mantle

American Geophysical Union Fall Meeting 2010, San Francisco (12/2010)

1. Iron-rich perovskite and post-perovskite in the lower mantle (invited oral presentation)

2. Properties of the deep-mantle ferropericlase across the spin crossover (contributed oral presentation)

Peking University, School of Earth and Space Sciences (09/2010; invited)

A new spin on mineral physics of the Earth's interior

Chinese Academy of Science, Institute of Geochemistry (09/2010; invited)

A new spin on mineral physics of the Earth's interior

Chinese Academy of Science, Institute of Physics (09/2010; invited)

Solid state geophysics under extreme environments: from electronic structures to Earth's interior

Argonne National Laboratory, Advanced Photon Source, Chicago

High-Pressure Elasticity Study of Iron by High-Resolution Inelastic X-ray Scattering (COMPRES Workshop on "On-line Brillouin Spectroscopy at GSECARS: Basic Principles and Application for High Pressure Research", 09/2009)

University of Texas at Austin

Solid state geophysics under extreme environments: from electronic structures to Earth's interior (Department of Physics, Condensed Matter Physics seminar series; 9/2010)

A pressing matter: Planetary interiors research under pressures (University Geology Society; 5/2010)

Laboratory journey to the Earth's core (Department of Geological Sciences; 4/2010)

Mineral physics research under extreme environments (Bureau of Economic Geology; 2/2010)

Seoul National University, School of Earth and Environmental Sciences, Korea (07/2009; invited)

Effects of the spin transitions of iron on mineral physics of the Earth's deep mantle

International Union of Crystallography (IUCr), Advanced Crystallography at High Pressure in Harbin, China (07/2009; invited)

A new spin on understanding mineral physics of the Earth's deep mantle

Chinese Academy of Science, Institute of High Energy Physics, Beijing Synchrotron Radiation Facility, Beijing (07/2009; invited)

New synchrotron lights on the physics of the Earth's interior

Forum on energy frontier under extreme environments
National Synchrotron Radiation Research Center, Taiwan (06/2009; invited)
 New Synchrotron Lights on the Physics of the Earth's Interior
German Mineralogical Society (DMG), The 86th Annual Meeting, Berlin (10/2008; invited
 keynote speaker)
 A new spin on understanding mineral physics of the Earth's deep mantle
Universitaet Bayreuth, Bayerisches Geoinstitut (09/2008; invited)
 Spin transitions of iron in Earth's lower mantle
 Hot dense iron, water, and silica
Argonne National Laboratory, Advanced Photon Source, Chicago
 Inelastic X-ray scattering at high pressures and temperatures: applications to mineral
 physics of the Earth's interior (Workshop to "Introduce High-Resolution Inelastic X-ray
 Scattering on Earth Materials using Synchrotron Radiation", 2008)
Okayama University at Misasa, The 3rd Center of Excellence-21st International Symposium:
 Origin, Evolution and Dynamics of the Earth: a Tribute to Prof. Eiji Ito (03/2008; invited
 keynote speaker)
 A New Spin on Mineral Physics of the Earth's Lower Mantle
Washington State University, Pullman, Institute for Shock Physics and School of Earth and
 Environmental Sciences (11/2007; invited)
 A new spin on understanding mineral physics of the Earth's deep mantle
University of Texas at Austin
 Spin transitions of iron in Earth's lower mantle (Department of Geological Sciences;
 10/2007)
 Mineral physics of iron and light elements in Earth's core (Institute of Geophysics; 10/2007)
University of Minnesota, Virtual Laboratory for Earth and Planetary Materials (08/2007;
 invited)
 Geophysical implications of the spin transition in the Earth's lower mantle
Lawrence Livermore National Laboratory, Physics and Advanced Technology (invited)
 Condensed matter geophysics: from electronic states to planetary interiors (2007)
 New light on earth and planetary interiors: from the Earth's core to hot dense H₂O (2005)
 Recent advances in laser-heated diamond anvil cell techniques: Applications to planetary
 interiors (2004)
Ehime University, Geodynamics Research Center (03/2007; invited)
 Electronic spin transition of iron in the Earth's deep mantle (17th GRC International
 Frontier Seminar)
 Iron in Earth's core and water in planetary interiors
Yale University, Department of Geology and Geophysics (01/2007; invited)
 Electronic spin transition of iron in the Earth's deep mantle
 Hot dense iron and water in planetary interiors
Tohoku University, Center of Excellence (COE), Japan (07/2006; invited)
 Iron in the Earth's interior
 H₂O and SiO₂ in planetary interiors
Lawrence Berkeley National Laboratory, Advanced Light Source (2006; invited)
 New synchrotron lights on the Earth's core and mantle
National Taiwan University, Department of Geosciences, Taiwan (2006; invited)
 Iron in the Earth's interior

American Physical Society March Meeting, Baltimore (03/2006; invited)
 Effects of the Spin Transition of Iron in Magnesiowüstite-(Mg,Fe)O: Applications to the Earth's Lower Mantle

National Synchrotron Radiation Research Center, Taiwan (2006; invited)
 Hot dense H₂O ices in planetary interiors
 New synchrotron lights on the Earth's core and mantle

Academia Sinica, Institute of Earth Sciences, Taiwan (invited)
 Iron as a new window into the Earth's core and lower mantle (2005)
 Mineral physics of the Earth's lower mantle and the core (2003)

National Cheng-Kung University, Department of Earth Sciences, Taiwan (2005; invited)
 Phase diagram of H₂O under extreme conditions

University of California-Berkeley, Department of Earth and Planetary Science (2005; invited)
 Iron in the Earth's interior: from sound velocities of iron in Earth's core to electronic transition of iron in Earth's mantle

Argonne National Laboratory, Advanced Photon Source, Chicago
 New synchrotron lights on the Earth's core and mantle (APS review panel, 2007)
 Iron as a new window into the Earth's core and lower mantle (2005)
 Understanding Earth's mantle and core by state-of-the-art IXS techniques (APS review panel, 2004)
 Understanding sound velocities in the Earth's core by Nuclear Resonant Inelastic X-ray Scattering" (Inelastic X-ray Scattering Workshop, 2004)
 Nuclear resonant inelastic x-ray scattering and synchrotron Mössbauer spectroscopy with laser-heated diamond anvil cells (Nuclear Resonant Workshop, 2004)
 Phase transitions of alumina and magnesiowüstite at megabar pressures (Megabar Pressures Workshop, 2004)
 Using laser-heated diamond anvil cell to study planetary interiors (Laser Heating Workshop, 2004)
 Understanding alloying effects of nickel and silicon on iron in the Earth's core (2002)

Princeton University, Department of Geosciences (2005; invited)
 Iron as a new window into the Earth's core and mantle

Jilin University, National Laboratory for Superhard Materials, Jilin University, China
 Recent and future advances in high-pressure research (2004)
 Understanding mineral physics of planetary interiors under extremely high pressures and temperatures (2004)
 New synchrotron lights on mineral physics of the Earth's interior (07/2009)

National Taiwan Ocean University, Institute of Geophysical Sciences, Taiwan (2004; invited)
 Mineral physics of the Earth's lower mantle and the core under extreme pressures and temperatures

University of Hawaii at Honolulu, GEORAMAN Meeting, Honolulu (2004; invited)
 In situ Raman spectroscopy in a laser-heated diamond cell: applications to materials in the planetary interiors

American Geophysical Union Fall Meeting, San Francisco
 Iron in the Earth's Lower Mantle and Core (12/2006; invited)
 Static compression of an iron-silicon alloy: implications for silicon in the core (12/2000)
 Direct measurements of sound velocities of iron with nuclear resonant inelastic x-ray scattering under high pressure and temperature" at Spring AGU, Canada (Mineral physics

perspective on the structure, composition, and dynamic of Earth's deep interior) (05/2004)

Florida International University, SMEC Conference (2003; invited)

Stability of magnesiowüstite in the Earth's lower mantle

Stony Brook University, Mineral Physics Institute (2003; invited)

Mineral stability and alloying effects in the Earth's mantle and the core: applications of laser heating DAC technique

Geophysical Laboratory, Carnegie Institution of Washington (2002; invited)

Alloying effects of silicon and nickel on iron in the Earth's core

The University of Chicago, Department of Geophysical Sciences, Chicago (2001)

Alloying effects of silicon and nickel on iron in the Earth's core

Research Grants

23. Project Title: Collaborative Research: Understanding Hydrogen Solubility Mechanisms in Bridgmanite Through Multifaceted Mineral Physics Studies

PIs: Jung-Fu Lin, Shun-ichiro Karato (Yale U), Bijaya Karki (LSU)

Sponsor Name: NSF-EAR in Cooperative Studies of the Earth's Deep Interior (CSEDI)

Project Period: 07/01/2020-6/30/2023 (NSF EAR-)

Funding Amount: \$241,000

22. Project Title: High Pressure-Temperature Single-Crystal Elasticity of the Lower-Mantle Bridgmanite

PIs: Jung-Fu Lin

Sponsor Name: NSF-EAR Geophysics

Project Period: 06/01/2019-5/31/2022 (NSF EAR-1916941)

Funding Amount: \$408,161

21. Project Title: Collaborative project: CSEDI -Electrical and Thermal Transport in Iron and Iron Alloys at Core Conditions and its Effects on the Geodynamo and Thermal Earth History

PIs: Ron Cohen (CIW), Jung-Fu Lin, Alex Goncharov (CIW), Peter Driscoll (CIW)

Sponsor Name: NSF-EAR in Cooperative Studies of the Earth's Deep Interior (CSEDI)

Project Period: 04/01/2019-3/31/2022 (NSF EAR-901801)

Funding Amount: \$269,841

20. Project Title: Deep Carbon Observatory 2020 Legacy Project

PI: Jung-Fu Lin

Sponsor Name: Sloan Foundation

Project Period: 3/01/2018-12/31/2018

Funding Amount: Total: \$10,001

19. Project Title: Characterization and modelling of methane hydrate reservoirs in the Gulf of Mexico

PI: Jung-Fu Lin, Co-PIs: Peter Flemings, Hugh Daigle, Kehua You

Sponsor Name: ExxonMobil-Energy Institute

Project Period: 3/01/2017-2/28/2020

Funding Amount: Total: \$942,900; Lin: \$305,699 (Task 1; PI)

18. Project Title: A multi-scale experimental investigation of flow properties in coarse-grained hydrate reservoirs during production
PI: Peter Flemings, Co-PIs: David DiCarlo, Hugh Daigle, D Nicolas Espinoza, Jung-Fu Lin, Nicola Tisato
Sponsor Name: Department of Energy
Project Period: 10/01/2016-09/30/2019
Funding Amount: Total: \$1,499,991; Lin: \$410,139 (Task 1)
17. Project Title: Stabilization of BCS Superconductivity near Room Temperature in Hydrides Under High Pressure and the Characterization with THz Spectroscopy
PI: Jianshi Zhou, Co-PIs: Jung-Fu Lin, Yaguo Wang, Artem Oganov, Phillip Allen
Sponsor Name: Army Research Office
Project Period: 09/01/2016-08/31/2018
Funding Amount: \$262,900
16. Project Title: EAGER: Coupled Opto-Electro-Mechanics in Semiconducting Phosphorene
PI: Deji Akinwande, Co-PI: Jung-Fu Lin
Sponsor Name: NSF Division of Electrical, Communications and Cyber Systems (ECCS)
Project Period: 05/01/2016-04/30/2018 (no cost extension to 12/2018)
Funding Amount: \$120,402
15. Project Title: In-situ nano-CT imaging of the pore network and organic matter evolution in shale rocks at high pressure-temperature conditions
PIs: Sheng Peng, Jung-Fu Lin
Sponsor Name: Seed Grant Program of the Jackson School of Geosciences
Project Period: 01/01/2016-12/31/2016
Funding Amount: \$17,376
14. Project Title: Understanding the Physics and Chemistry of Iron Alloys relevant to the Conditions of Planetary Cores
PIs: Aaron Bernstein, Jung-Fu Lin
Sponsor Name: Z Machine, Sandia National Laboratory
Project Period: 04/01/2016-12/31/2019
Funding Amount: 4 shots for the Z Machine
13. Project Title: Collaborative project: CSEDI -Understanding Si and Fe differentiation in Earth's mantle and core through experimental and theoretical research in geochemistry and mineral physics
PIs: Nicolas Dauphas, Jung-Fu Lin, Renata Wentzcovitch
Sponsor Name: NSF-EAR in Cooperative Studies of the Earth's Deep Interior (CSEDI)
Project Period: 04/01/2015-3/31/2018 (NSF EAR-1502594) (no cost extension to 03/2020)
Funding Amount: \$226,275
12. Project Title: Elasticity and Spin Transitions of Iron in the Earth's Lower Mantle
PI: Jung-Fu Lin

Sponsor Name: NSF-EAR in Geophysics, Petrology/Geochemistry
Project Period: 01/01/2015-12/31/2017 (NSF EAR-1446946) (no cost extension to 12/2018)
Funding Amount: \$372,273

11. Project Title: Thermodynamics of Planetary Ices in Extreme Conditions of Icy Satellites
PI: Jung-Fu Lin
Sponsor Name: Seed Grant Program of the Jackson School of Geosciences
Project Period: 01/01/2014-12/31/2014
Funding Amount: \$19,911
10. Project Title: Physics and Chemistry of Carbon at Extreme Conditions
PI: Jung-Fu Lin
Sponsor Name: Deep Carbon Observatory (DCO), Alfred P. Sloan Foundation
Project Period: 10/01/2013-9/30/2019
Funding Amount: \$56,000 (2013-2015); \$56,000 (2015-2017), \$50,400 (2017-2019)
9. Project Title: 7th North American Mössbauer Symposium
PI: Jung-Fu Lin
Sponsor Name and Funding Amount: \$5,000
(1). COMPRES, Argonne National Laboratory, and Corporate Sponsors
Project Period: 1/1/2013-1/31/2013 at the Jackson School of Geosciences, University of Texas at Austin
8. Project Title: Acquisition of an Impulsive Stimulated Light Scattering (ISLS) System for Elasticity and Thermal Conductivity Studies
Sponsor Name: Instrumentation and Facility, National Science Foundation
Project Period: 04/15/2012-3/31/2014
Funding Amount: \$168,000; additional \$168,000 JSG Matching Funding
7. Project Title: Acquisition of a Piston Cylinder Apparatus for Research in Experimental Petrology and Mineral Physics
PIs: James Gardner (lead PI in experimental petrology); Lin (co-PI; mineral physics)
Sponsor Name: Instrumentation and Facility, National Science Foundation
Project Period: 01/01/2011-12/31/2011 (EAR-1053889)
Funding Amount: \$40,355; additional \$40,355 JSG Matching Funding
6. Project Title: Workshop: Dynamic Phenomena under Extremes
PIs: Jung-Fu Lin, Vitali Prakapenka, Alex Goncharov
Sponsor Name and Funding Amount: \$27,000
(1). CDAC, Carnegie-DOE Alliance Center : \$9,000.
(2). COMPRES, the Consortium for Materials Properties Research in Earth Sciences: \$9,000
(3). Corporate Sponsors (Almax Industries, Princeton Instruments, Technodiamant): \$9,000
Project Period: 1/24/2011-1/28/2011 at the AT&T Center, University of Texas at Austin
5. Project Title: CAREER: Phase Diagrams and Elasticity of Iron Alloys in the Earth's Core
PIs: Jung-Fu Lin

Sponsor Name: NSF-EAR Early Career Award in Geophysics, Petrology/Geochemistry
Project Period: 01/15/2011-12/31/2015 (NSF EAR-1056670)
Funding Amount: \$538,914

4. Project Title: Electronic Spin Transition of Iron in the Earth's Lower Mantle
PIs: Jung-Fu Lin
Sponsor Name: NSF-EAR in Geophysics, Petrology/Geochemistry
Project Period: 01//01/2009-12/31/2012 (NSF EAR-0838221)
Funding Amount: \$299,955
3. Project Title: Energy Frontier Research in Extreme Environments (EFree)
PIs: Jung-Fu Lin (UT Austin)
Sponsor Name: Energy Frontier Research Centers (EFRCs), Department of Energy (DOE)
Project Period: 08/01/2009-07/31/2014
Funding Amount: \$300,000 (EFree also provides additional infrastructure supports)
2. Project Title: Transition Metal Oxides and f-band Metals under Extreme Environments
PIs: Jung-Fu Lin (UT Austin)
Sponsor Name: Carnegie/DOE Alliance Center (CDAC), Department of Energy (DOE)
Sponsor Period: 02/01/2009-02/28/2013
Funding Amount:
 - (1). \$44,742 (3/2010-2/2010)
 - (2). \$72,919 (03/2010-02/2011)
 - (3). \$90,158 (03/2011-02/2012) (additional \$60,000 from JSG Equipment Matching Fund for a Brillouin Light Scattering system)
 - (4). \$76,900 (03/2012-02/2013)(CDAC also provides additional financial supports to Lin's students' travel expenses to the Advanced Photon Source, Argonne National Laboratory for experiments. It also allocates synchrotron beamtime access through partnership)
1. Project Title: Spin Transition of Iron in the Earth's Lower Mantle
PIs: Jung-Fu Lin
Sponsor Name: Summer Research Assignment (SRA), Faculty Development Review Committees, University of Texas at Austin
Sponsor Period: 06/01/2010-07/31/2010
Funding Amount: two-month summer salary

Honors, Awards, Fellowships and Lectureships

2016	Outstanding Young Alumni Award of the National Cheng-Kung University
2015	Fellow of the Mineralogical Society of America
2014-2018	Faculty Investment Initiative Award of the University of Texas at Austin
2014	William T. Smith Lecturer, University of Michigan at Ann Arbor, Department of Earth and Environmental Sciences
2012-2015	Visiting Professorship, Okayama University at Misasa, Japan
2011-2015	NSF-EAR Early Career Award in Geophysics/Petrology/Geochemistry

2014-current Total E&P USA Petroleum Faculty Fellowship of the Department of Geological Sciences, Jackson School of Geosciences, University of Texas at Austin
2005-2008 Lawrence Livermore Fellowship, Lawrence Livermore National Laboratory
2002-2004 Carnegie Fellowship, Carnegie Institution for Science

Courses Taught

09/2019-08/2020 Academic Year

Earth Materials, GEO 416K, Fall 2019
Physics and Chemistry of the Earth's Mantle, GEO 391, Fall 2019 (co-taught with S. Grand and T. Becker)

09/2018-08/2019 Academic Year

Physical Geology, GEO 401, Spring 2019
Mineral Physics, GEO 391, Spring 2019
Physics and Chemistry of a Habitable Planet, One-week summer course at National Cheng-Kung University, Taiwan, 07/2019

09/2017-08/2018 Academic Year

Earth Materials, GEO 416K, Fall 2017
Methane Hydrates, GEO 391, Spring 2018 (co-taught with Dr. Flemings)

09/2016-08/2017 Academic Year

Physical Geology, GEO 401, Spring 2017
Physics of the Earth's Interior, GEO 391, Spring 2017

09/2015-08/2016 Academic Year

Earth Materials, GEO 416K, Fall 2015
Mineral Physics, GEO 391, Spring 2016

09/2014-08/2015 Academic Year

Mineral Physics, GEO 391, Fall 2014
(Sabbatical semester in spring 2015)

09/2013-08/2014 Academic Year

Earth Materials, GEO 416K, Fall 2013
Physics of the Earth's Interior, GEO 391, Spring 2014

09/2012-08/2013 Academic Year

Physical Geology, GEO 401, Spring 2013
Mineral Physics, GEO 391, Spring 2013
Technical Sessions, GEO 193, Fall 2012 and Spring 2013 (co-taught with Dr. Kyle Spikes)

09/2011-08/2012 Academic Year

Physical Geology, GEO 401, Spring 2012
Technical Sessions, GEO 193, Fall 2011 and Spring 2012 (co-taught with Dr. Tim Shanahan)
Physics of the Earth's Interior, GEO 391, Spring 2012 (co-taught with Dr. Steve Grand)

09/2010-08/2011 Academic Year

Physical Geology, GEO 401, Spring 2011
Mineral Physics, GEO 391, Spring 2011

09/2009-08/2010 Academic Year

Physical Geology, GEO 401, Spring 2010
Physics of the Earth's Interior, GEO 391, Spring 2010

09/2008-08/2009 Academic Year

Mineral Physics, GEO 391, Spring 2008

Research Keywords

Mineral physics, Earth's interior, planetary interiors, high pressure, iron alloys in Earth's core, solid-Earth geophysics and geochemistry, mineralogy, spin and phase transitions in Earth's mantle, iron isotope fractionation, silica and silicate glasses and melts, water and water chemistry, materials synthesis, transition metal compounds, pnictides, methane hydrate, 2D materials, superconducting hydrides, diamond anvil cell, optical spectroscopy, synchrotron X-ray spectroscopy, X-ray diffraction, X-ray emission spectroscopy, nuclear resonant inelastic X-ray scattering, synchrotron Mossbauer spectroscopy, Brillouin light scattering, impulsive stimulated light scattering, Raman spectroscopy.