

Curriculum Vitae



Yang LIU Research Scientist

Jet Propulsion Laboratory
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Education

The University of Michigan, Ph.D. Geology, April 2003
The University of Michigan, M.S., Geology, December 1998
Chengdu University of Technology, B.S., Petroleum, July 1995

Teaching Experience

Lecturer, Spring of 2013-2015, *Caltech*

GS115c-Petrography of Igneous and Metamorphic Rock: lab-based course for undergraduate students.

Instructor, Spring, 2006, 2010, 2011, *University of Tennessee*

GS460-Principles of Geochemistry: Developed syllabus and course materials of a senior-graduate level course with 9 students.

GS630-Phase Equilibria: Discussion-type graduate courses on silicate phase diagrams with 5-6 students.

Guest Lecturer, Winter, 2007, 2009, *University of Tennessee*,

GS103-Earth and Environment: 1.5 hour lecture on volcanic hazards to ~100 students.

Graduate Teaching Assistant, Winter, 2001, 2002, *University of Michigan*

GS 410-Earth Materials: Routine lectures on course topics; Design of the curriculum, experiments and exams for the lab section.

Other Teaching-Associated Activities, 1998, 1999, 2000, *University of Michigan*,

Participant of teaching workshops for international and graduate students. Lab assistant teaching users of a Cameca MBX electron microprobe and a Hitachi scanning electron microscope.

Mentoring Experience

Jet Propulsion Lab, Caltech	2013-present	Supervisor
Postdocs: Yang Chen, Jinping Hu		
Summer interns: Richard Kim, USC (2015); Barry Chew (2014)		
California Institute of Technology	2014-2015	Co-Mentor
Undergraduate: Jen Caseres Senior Thesis, results presented at MetSoc 2015.		
University of Tennessee, Knoxville, TN	2007-2012	Co-supervisor
Postdocs: Amit Basu Sarbadhikari, Amy VJ Riches, Ioannis Baziotis.		
Projects of Master students: Darren Schnare and Mike Mellin		
University of Michigan, Ann Arbor, MI	1998	
Supervisor of an undergraduate student (J Sohn) in his summer research project		

Research Experience

Research Scientist, JPL (& Visiting Associate at Caltech)

Division of Geophysics and Planetary Geosciences, *Nov. 2012-present*

- Origin and heterogeneity of volatiles in planetary materials.
- Mineralogy and petrology of planetary materials.
- Mission architecture in Mars Sample Return Science Planning and Mars Return Sample Handling.
- Investigation scientist for Mars 2020 PIXL instrument.
- Deputy project scientist for New Frontier MoonRise proposal.

Research Assistant Professor, University of Tennessee

Planetary Geosciences Institute, Department of Earth and Planetary Sciences, *Jan. 2010-Oct. 2012*

- Verified “water” in lunar rocks and soils.
- Investigated the evolution of the crust and mantle of planetary bodies through the study of meteorites and lunar rocks.
- Investigated diamondiferous eclogites.

Post-Doctoral Researcher, University of Tennessee, Advisor: Lawrence A. Taylor

Planetary Geosciences Institute, Department of Earth and Planetary Sciences, *May 2005-Dec. 2009*

- Characterized lunar soils and rocks for future lunar exploration.
- Investigated the evolution of the crust and mantle of planetary bodies through the study of meteorites and lunar rocks.
- Studied the world’s largest diamondiferous eclogite and mineral inclusions in diamond.

Post-Doctoral Researcher, University of Chicago, Advisor: Alfred T. Anderson

Department of Geophysical Sciences, *Jan. 2003-April 2005*

- Investigated the evolution of large silicic magmatic bodies, using compositions of quartz-hosted melt inclusions and zoning patterns of quartz.
- Developed a method for estimating magma ascent rate.

Graduate Research Assistant, University of Michigan, Advisor: Youxue Zhang

Department of Geological Sciences, *Sept. 1996- Dec. 2002*

- Conducted experiments of bubble growth in rhyolitic melt, leading to verification of a numerical model of bubble growth.
- Investigated H₂O speciation, solubility, and diffusion in silicic melts.

Visiting Student, Universität Hannover, Germany, Collaborator: Harald Behrens

Institut für Mineralogie, *Jan.-July 2000 and July-Aug. 2001*

- Studied H₂O solubility at low pressures and synthesized hydrous dacite and andesite using internally-heated pressure vessels (IHPV).

Visiting Student, University of Bristol, UK, Host: Steve Sparks

Department of Earth Sciences, *Mar.-May 2000*

- Participated a Volcanology Short Course, organized by Dr. R.S.J. Sparks, including physical properties of melts, experiments on fluid mechanics and modeling of volcanic eruptions, volcanic eruption monitoring, and risk assessment.

Analytical/Experimental Instrument Experience

- *Quantitative Analysis*: Excellent in electron microscope analysis (electron induced X-ray of elements for quantitative analysis)
- *Scanning Electron Microscopy*: Managed a JEOL JSM-6010LV (educational grade) scanning electron microscope (SEM), extensive use of high-resolution FE SEMs (FEI, Zeiss)

- *IR Spectroscopy*: Setup of a Perkin-Elmer FTIR GX with a microscope unit, and frequent use of Raman spectrometers for mineralogy
- *Mass Spectrometry*: Extensive experience with secondary ion mass spectrometers
- *Other techniques*: In-depth knowledge of powder X-ray diffraction (XRD); Familiar with transmission electron microscope (TEM) for nano-scale imaging; Knowledge of XRF
- *Experimental Apparatus*: Setup of a rapid-quench cold-seal pressure vessel with a TZM bomb; frequent use of cold-seal vessels and internally heated pressure vessels.

Service

NASA: Panelist and reviewer for multiple NASA ROSES and CAN programs, & Judge for NASA Centennial Challenge (Sample Return Robot)

Guest Editor: *Geochimica et Cosmochimica Acta*,

Journal Reviewers: *Annals of Geophysics*, *American Mineralogist*, *Bulletin of Volcanology*, *Chemical Geology*, *Contributions to Mineralogy and Petrology*, *Geochimica et Cosmochimica Acta*, *Geology*, *International Geology Review*, *Journal of Geology*, *JGR*, *Journal of Volcanology and Geothermal Research*, *Meteoritics & Planetary Science*, *Planetary and Space Science*

Conveners: Southeastern GSA 2006; Western Pacific Geophysics Meeting 2006, Goldschmidt 2010, 2014; GSA 2013.

Program Committee: 8th International Mars conference

Volunteer: Door of Hope 2013

Professional Association

Mineralogical Society of America, Geological Society of America, The Meteoritical Society, American Geophysical Union

Awards and Honor

2016 Voyager Award; MED Team Award, JPL

2014 Mariner Award, JPL

1998-2001 Three Turner Awards, Dept. of Geological Sci., Univ. of Michigan, Ann Arbor, MI

1992-1994 Excellent Academic Achievement Award, Chengdu University of Technology

Invited Talks

- Geological Society of America, Seattle, WA, “T198. Apatite As a Versatile Tool for Enabling Planetary Science”, Oct 22-25, 2017
- Geological Society of America, Boulder, Colorado, “Volatiles & Magma Ascent Rates”, Oct., 2014
- University of California, San Diego: “Some New Constraints on Martian Meteorites”, Oct., 2013
- Caltech: “Water on the Moon”, Feb., 2013
- Goldschmidt 2012: “Water , Water, Everywhere on the Moon”, June, 2012
- Geological Society of America, Boulder, Colorado, “Volatiles & Magma Ascent Rates”, Nov., 2010
- East Tennessee Geological Society, Knoxville, “Water on the Moon”, Nov., 2010
- Tennessee Technology Society, Knoxville, “Water on the Moon”, Oct., 2010
- University of Tennessee, Knoxville, Earth & Planetary Science Department, “Water on the Moon”, Sept., 2010
- University of Tennessee, Knoxville, Earth & Planetary Science Department, “Volatiles in Silicate Melts and Volcanic Eruptions”, Jan., 2007

New Minerals

- 1) Ma, C., **Liu, Y.**, and Tschauner, O. (2013). Tissintite. *IMA 2013-027. CNMNC Newsletter No. 16, Aug. 2013, Page 2707; Mineralogical Magazine, 77, 2695-2709.*
- 2) Tschauner, O., Ma, C., and **Liu, Y.** (2013). Ahrensite. *IMA 2013-028. CNMNC Newsletter No. 16, Aug. 2013, Page 2707; Mineralogical Magazine, 77, 2695-2709.*

New Meteorite Classified

- 1) **Liu, Y. (2016)** NWA 10553, brecciated eucrite, *Meteorite Bulletin, 105.*
- 2) **Liu, Y. (2016)** NWA 10554, eucrite, *Meteorite Bulletin, 105.*

Publications

Peer-Reviewed Articles (*Post-doc, Google scholar h-index = 29)

- 1) **Liu, Y.**, Fischer, W.W., Ma, C., Beckett, J.R., Tschauner, O., Guan, Y., Lingappa, U.F., Webb, S.M., Prakapenka, V.B., Lanza, N.L., Agee, C.B. **2019**. Manganese oxides in Martian meteorites Northwest Africa (NWA) 7034 and 7533. *Geochimica et Cosmochimica Acta* (in revision).
- 2) Ma, C., **Liu, Y.** 2019. Discovery of a zinc-rich mineral on the surface of lunar orange pyroclastic beads. *American Mineralogist* **104**, 447-452.
- 3) McIntosh, E., Day, J.M.M., **Liu, Y.**, Jiskoot, C. 2019. Examining the compositions of impactors striking the Moon using Apollo impact melt coats and lunar regolith breccia meteorites. *Geochimica et Cosmochimica Acta* (submitted).
- 4) Carrier, B.L., Abbey, W.J., Beegle, L.W., Bhartia, R., **Liu, Y.** 2019 Attenuation of ultraviolet radiation in rocks & minerals: Implications for Mars science. *JGR-Planet* 10.1029/2018JE005758.
- 5) Ma, C., Tschauner, O., Beckett, J. R., **Liu, Y.** 2019. Chenmingite, FeCr₂O₄ in the CaFe₂O₄-type structure, a shock-induced, high-pressure mineral in the Tissint martian meteorite. *American Mineralogist* **104**, 1521-1525.
- 6) **Liu, Y.**, Chen Y., Guan Y., Eiler, J.M., Ma C., Rossman, G.R., Zhang, Y. **2018**. Impact-melt hygrometer for Mars: The case of shergottite Elephant Moraine (EETA) 79001. *Earth & Planetary Science Letters*, **490**, 206-215.
- 7) Day, J.M.D., Tait, K.T., Udry, A., Moynier, F., **Liu, Y.**, and Neal, C.R. 2018. Martian magmatism from plume metasomatized mantle. *Nature Communications*, **9(1)**, 4799.
- 8) Myers, M.L., Wallace, P.J., Wilson, C.J.N., Watkins, J.L., **Liu, Y.** 2018. Ascent rates of rhyolitic magma at the onset of three caldera-forming eruptions. *American Mineralogist*, **103**, 952-965.
- 9) Hui, H., Guan, Y., Chen, Y., Peslier, A. H. Zhang, Y., **Liu, Y.**, Flemming, R. L., Rossman, G. R., Eiler, J. M., Neal, C. R., Osinski, G. R. **2017**. A heterogeneous lunar interior for hydrogen isotopes as revealed by lunar highlands samples. *Earth & Planetary Science Letters*, **473**, 14-23.
- 10) Kuchka, CR, Herd, C., Walton, E. L., Guan, Y., **Liu, Y.** 2017. Martian near-surface materials in shock-melt pockets in Tissint: Constraints on their preservation in shergottite meteorites. *Geochimica et Cosmochimica Acta*, **210**, 228-246.
- 11) **Liu, Y.**, Ma, C., Beckett, J., Chen, Y., Guan, Y. **2016a**. Rare-earth-element minerals in martian breccia meteorite NWA 7034 and 7533: Implications for fluid-rock interaction in the martian crust. *Earth & Planetary Science Letters*, **451**, 251-262.
- 12) **Liu, Y.**, Baziotis, I.P., Asimow, P.D., Bodnar, R.J., Taylor, L.A., 2016b. Mineral chemistry of the Tissint meteorite: Indications of two-stage crystallization in a closed system. *Meteoritics & Planetary Science*, **51**, 2293-2315.
- 13) Howarth, G.H., **Liu, Y.**, Chen, Y., Pernet-Fisher, J.F., and Taylor, L.A. 2016. Postcrystallization metasomatism in shergottites: Evidence from the paired meteorites LAR 06319 and LAR 12011. *Meteoritics & Planetary Science*, **51**, 2061-2072.
- 14) Ma, C., Tschauner, O., Beckett, J. R., **Liu, Y.**, Rossman, G. R., Stanislav, V., Sinogeikin, S., Smith, J., Taylor, L. A. 2016. Ahrensite, γ -Fe₂SiO₄, a new shock-metamorphic mineral from the Tissint

- meteorite-implications for the Tissint shock event on Mars. *Geochimica et Cosmochimica Acta*, **184**, 240-256.
- 15) Taylor, L.A., **Liu, Y.**, Lofgren, G. 2016. Integrity of lunar soil samples. *Nature Geoscience*, **9**, 87-87.
 - 16) Taylor L. A., Logvinova, A., Howarth, G.H., **Liu, Y.**, Peslier, A., Guan, Y., Chen, Y., Sobolev, N.V. 2016. Low water contents in diamond mineral inclusions: Proto-genetic origin in a dry cratonic lithosphere. *Earth & Planetary Science Letters*, **433**, 125-132.
 - 17) *Chen, Y., **Liu, Y.**, Guan, Y., Eiler, J., Ma, C., Rossman, G. R., Taylor, L. A. **2015a**. Evidence in Tissint for recent subsurface water on Mars. *Earth & Planetary Science Letters*, **425**, 55-63.
 - 18) *Chen, Y., Zhang, Y.-X., **Liu, Y.**, Guan, Y., Eiler, Stolper, E.M. 2015b. Water, fluorine, and sulfur concentrations in the lunar mantle. *Earth & Planetary Science Letters*, **427**, 37-46.
 - 19) Ma, C., Tschauer, O., Beckett, J. R., **Liu, Y.**, Rossman, G. R., Zuravlev, K., Prakapenka, V., Dera P., Sinogeikin, S., Taylor, L. A. 2015. Tissintite, (Ca,Na,□)AlSi₂O₆, a highly defective shock-induced, high-pressure clinopyroxene in the Tissint Martian meteorite. *Earth & Planetary Science Letters*, **422**, 194-205.
 - 20) McCubbin, F. M., Vander Kaaden, K. E., Tartese, R., Klima, R.L., **Liu, Y.**, and 9 more authors. 2015. Volatiles (H, C, N, F, S, Cl) in the lunar mantle, crust, and regolith: Distribution, processes, sources, and significance. *Am. Min.*, *Invited Review* **100**, 1668-1707.
 - 21) Thompson, D.R., 9 authors, Liu, Y., Wade, L.A. 2015. Automating X-ray fluorescence analysis for rapid astrobiology surveys. *Astrobiology*, **15**, 961-976.
 - 22) *Pernet-Fisher, J.F., Howarth, G.H., **Liu, Y.**, Barry, P.H., Taylor, L. A. **2014**. Estimating the lunar mantle water budget from phosphates: Complications associated with silicate-liquid-immiscibility. *Geochimica et Cosmochimica Acta*, **144**, 326-341.
 - 23) *Pernet-Fisher, J.F., Howarth, G.H., **Liu, Y.**, Barry, P.H., Carmody, L., Valley, J.W., Bodnar, R.J., Spetsius, Z.V., and Taylor, L.A. 2014. Komsomolskaya diamondiferous eclogites: Evidence for oceanic crustal protoliths. *Contrib. Mineral. Petrol.*, **167**, 1-17.
 - 24) **Liu, Y.**, Balta, J.B., Goodrich, C.A., McSween, H.Y., and Taylor L.A. **2013**. New constraints on the formation of Elephant Moraine 79001 Lithology A. *Geochimica et Cosmochimica Acta*, **108**, 1-20.
 - 25) *Baziotis, I. P., **Liu, Y.**, DeCarli, P., Melosh, J., McSween, H.Y., Bodnar, R.J., and Taylor L.A. 2013. The Tissint martian meteorite as evidence for the largest impact excavation. *Nature Communication*, **4**, 1404, DOI: 10.1038.
 - 26) He, Q., Xiao, L., Hsu, W., Balta, J.B., McSween, H.Y. and **Liu, Y.** 2013. The water content and parental magma of the second chassignite NWA 2737: Clues from trapped melt inclusions in olivine. *Meteoritics & Planetary Science*, **48**, 474-492.
 - 27) Sedaghtpour, F., Teng, F.-Z., **Liu, Y.**, and Taylor, L.A., 2013. Magnesium isotopic composition of the Moon. *Geochim. Cosmochimica Acta*, **120**, 1-16.
 - 28) **Liu Y.**, Guan Y., Zhang Y., Rossman G.R., Eiler J.M., Taylor L.A. **2012a**. Direct measurement of hydroxyl in the lunar regolith and the origin of lunar surface water. *Nature Geoscience*, **5**, 779-782.
 - 29) Day, J.M.D., Walker, R.J., Ash, R.D., **Liu, Y.**, Rumble, D., Irving, A.J., Goodrich, C.A., Tait, K., McDonough, W.F., and Taylor, L.A., 2012. Origin of Graves Nunataks 06128 and 06129, brachinites, and brachinite-like achondrites by partial melting of volatile-rich primitive parent bodies. *Geochimica et Cosmochimica Acta*, **81**, 94-128.
 - 30) Riches, A.J.V., Day, J.M.D., Walker, R.J., Simonetti, A., **Liu, Y.**, Neal, C.R. and Taylor, L.A., 2012. Rhenium-osmium isotope and highly-siderophile-element abundance systematics of angrite meteorites. *Earth and Planetary Science Letters*, **353-354**, 208-218.
 - 31) Zhang, A.C., Taylor, L.A., Wang, R.-C., Li, Q., Li, X., Patchen, A.D., and **Liu, Y.**, 2012a. Thermal history of Apollo 12 granite and KREEP-rich rock: Clues from Pb/Pb ages of zircon in lunar breccia 12013. *Geochimica et Cosmochimica Acta*, **95**, 1-14.
 - 32) **Liu, Y.**, and Taylor L.A., **2011b**. Characterization of lunar dust and a synopsis of available lunar simulants. *Planetary and Space Science*, **59**, 1769-1783.

- 33) **Liu, Y.**, and Taylor L.A., 2011a. 月球上的“水” (Water on the Moon). *Acta Petrologica Sinica*, **27**, 579-588.
- 34) Isaacson, P.J., Basu Sarbadhikari, A., Pieters, C.M., Klima, R.L., Hiroi, T., **Liu, Y.**, and Taylor, L.A., 2011. The lunar rock and mineral characterization consortium: Deconstruction and integrated analyses of mare basalts. *Meteoritics & Planetary Science*, **46**, 228-251.
- 35) Riches, A.J.V., **Liu, Y.**, Day, J.M.D., Puchtel, I.S., Rumble, D., McSween, H.Y., Walker, R.J., and Taylor, L.A., 2011. Petrology and geochemistry of Yamato 984028: A highly-depleted cumulate lherzolitic shergottite. *Polar Science*, **4**, 497-514.
- 36) Sarbadhikari, A.B., Goodrich, C.A., **Liu, Y.**, Day, J.M.D., and Taylor, L.A., 2011. Evidence for heterogeneous enriched shergottite mantle sources in Mars from olivine-hosted melt inclusions in Larkman Nunatak 06319. *Geochimica et Cosmochimica Acta*, **75**, 6803-6820.
- 37) **Liu, Y.**, Spicuzza, M.J., Craddock, P.R., Day, J.M.D., Valley, J.W., Dauphas N., and Taylor L.A., **2010**. Oxygen and iron isotope constraints on near-surface fractionation effects and the composition of lunar mare basalt source regions. *Geochimica et Cosmochimica Acta*, **74**, 6249-6262.
- 38) Boyce, J.W., **Liu, Y.**, Rossman, G.R., Guan, Y.B., Eiler, J.M., Stolper, E.M., and Taylor, L.A., 2010. Lunar apatite with terrestrial volatile abundances. *Nature*, **466**, 466-469.
- 39) Riches, A.J.V., **Liu, Y.**, Day, J.M.D., Spetsius, Z.V., and Taylor L.A., 2010b. Subducted oceanic crust as diamond hosts revealed by garnets of mantle xenoliths from Nyurbinskaya, Siberia. *Lithos*, **120**, 368-378.
- 40) Zhang, A.C., Guan, Y.B., Hsu, W.B.A., **Liu, Y.**, and Taylor, L.A., 2010. Origin of a metamorphosed lithic clast in CM chondrite Grove Mountains 021536. *Meteoritics & Planetary Science*, **45**, 238-245.
- 41) Zhang, A.C., Hsu, W.B., Floss, C., Li, X., Li, Q., **Liu, Y.**, and Taylor, L.A., 2010. Petrogenesis of lunar meteorite Northwest Africa 2977: Constraints from in situ microprobe results. *Meteoritics & Planetary Science*, **45**, 1929-1947.
- 42) **Liu, Y.**, Floss, C., Day, J.M.D., Hill, E., and Taylor, L.A., **2009a**. Petrogenesis of lunar mare basalt meteorite Miller Range 05035. *Meteoritics & Planetary Science*, **44**, 261-284.
- 43) **Liu, Y.**, Taylor, L.A., Sarbadhikari, A.B., Valley, J.W., Ushikubo, T., Spicuzza, M.J., Kita, N., Ketcham, R.A., Carlson, W., Shatsky, V., and Sobolev, N.V., 2009b. Metasomatic origin of diamonds in the world's largest diamondiferous eclogite. *Lithos*, **112**, 1014-1024.
- 44) Day, J.M.D., Ash, R.D., **Liu, Y.**, Bellucci, J.J., Rumble, D., McDonough, W.F., Walker, R.J., and Taylor, L.A., 2009a. Asteroids and andesites Reply. *Nature*, **459**, E1-E2.
- 45) Day, J.M.D., Ash, R.D., **Liu, Y.**, Bellucci, J.J., Rumble, D., McDonough, W.F., Walker, R.J., and Taylor, L.A., 2009b. Early formation of evolved asteroidal crust. *Nature*, **457**, 179-183.
- 46) Hill, E., Taylor, L.A., Floss, C., and **Liu, Y.**, 2009. Lunar meteorite LaPaz Icefield 04841: Petrology, texture, and impact-shock effects of a low-Ti mare basalt. *Meteoritics & Planetary Science*, **44**, 87-94.
- 47) Ni, H.W., **Liu, Y.**, Wang, L.J., and Zhang, Y.X., 2009. Water speciation and diffusion in haploandesitic melts at 743-873 K and 100 MPa. *Geochimica et Cosmochimica Acta*, **73**, 3630-3641.
- 48) Sarbadhikari, A.B., Day, J.M.D., **Liu, Y.**, Rumble, D., and Taylor, L.A., 2009. Petrogenesis of olivine-phyric shergottite Larkman Nunatak 06319: Implications for enriched components in martian basalts. *Geochimica et Cosmochimica Acta*, **73**, 2190-2214.
- 49) Taylor, L.A. and **Liu, Y.**, 2009. Sulfide inclusions in diamonds: not monosulfide solid solution. *Russian Geology and Geophysics*, **50**, 1201-1211.
- 50) Wallace, W.T., Taylor, L.A., **Liu, Y.**, Cooper, B.L., McKay, D.S., Chen, B., and Jeevarajan, A.S., 2009. Lunar dust and lunar simulant activation and monitoring. *Meteoritics & Planetary Science*, **44**, 961-970.
- 51) **Liu, Y.**, Park, J., Schnare, D., Hill, E., and Taylor, L.A., **2008a**. Characterization of lunar dust for toxicological studies. II: Texture and shape characteristics. *Journal of Aerospace Engineering*, **21**, 272-279.

- 52) **Liu, Y.**, Schnare, D.W., Eimer, B.C., and Taylor, L.A., 2008b. Dry separation of respirable lunar dust: Providing samples for the lunar airborne dust toxicity advisory group. *Planetary and Space Science*, **56**, 1517-1523.
- 53) Park, J., **Liu, Y.**, Kihm, K.D., and Taylor, L.A., 2008. Characterization of lunar dust for toxicological studies. I: Particle size distribution. *Journal of Aerospace Engineering*, **21**, 266-271.
- 54) Schnare, D.W., Day, J.M.D., Norman, M.D., **Liu, Y.**, and Taylor, L.A., 2008. A laser-ablation ICP-MS study of Apollo 15 low-titanium olivine-normative and quartz-normative mare basalts. *Geochimica et Cosmochimica Acta*, **72**, 2556-2572.
- 55) **Liu, Y.**, Anderson, A.T., and Wilson, C.J.N., **2007**. Melt pockets in phenocrysts and decompression rates of silicic magmas before fragmentation. *Journal of Geophysical Research-Solid Earth* **112**, B06204, doi:10.1029/2006JB004500.
- 56) **Liu, Y.**, Taylor, L.A., Thompson, J.R., Schnare, D.W., and Park, J.S., 2007. Unique properties of lunar impact glass: Nanophase metallic Fe synthesis. *American Mineralogist*, **92**, 1420-1427.
- 57) Hill, E., Mellin, M.J., Deane, B., **Liu, Y.**, and Taylor, L. A., 2007. Apollo sample 70051 and high- and low-Ti lunar soil simulants MLS-1A and JSC-1A: Implications for future lunar exploration. *Journal of Geophysical Research-Planets*, **112**, E02006, doi:10.1029/2006JE002767.
- 58) **Liu, Y.**, Anderson, A.T., Wilson, C.J.N., Davis, A.M., and Steele, I.M., **2006**. Mixing and differentiation in the Oruanui rhyolitic magma, Taupo, New Zealand: evidence from volatiles and trace elements in melt inclusions. *Contributions to Mineralogy and Petrology*, **151**, 71-87.
- 59) **Liu, Y.**, Zhang, Y.X., and Behrens, H., **2005**. Solubility of H₂O in rhyolitic melts at low pressures and a new empirical model for mixed H₂O-CO₂ solubility in rhyolitic melts. *Journal of Volcanology and Geothermal Research*, **143**, 219-235.
- 60) **Liu, Y.**, Behrens, H., and Zhang, Y.X., **2004a**. The speciation of dissolved H₂O in dacitic melt. *American Mineralogist*, **89**, 277-284.
- 61) **Liu, Y.**, Zhang, Y.X., and Behrens, H., 2004b. H₂O diffusion in dacitic melts. *Chemical Geology*, **209**, 327-340.
- 62) Zhang, Y.X., Xu, Z.J., and **Liu, Y.**, **2003**. Viscosity of hydrous rhyolitic melts inferred from kinetic experiments, and a new viscosity model. *American Mineralogist*, **88**, 1741-1752.
- 63) **Liu, Y.** and Zhang, Y.X., **2000**. Bubble growth in rhyolitic melt. *Earth and Planetary Science Letters*, **181**, 251-264.

Other Papers

- 1) Velazco, JE, Taylor, M, Liu, Y, Hodyss, R, Allwood, A 2016. A Novel Rotating-Wave X-Ray Source for Analysis of the Martian Landscape. The Interplanetary Network Progress Report, 207, 1-12.
- 2) Eiler, J; Blacksberg, J.; et al. (2013) In situ science and instrumentation for primitive bodies. KISS report

Conference Papers

- 3) Fraeman AA, Ehlmann B.L., Northwood-Smith G.W.D., **Liu Y.**, Wadhwa M., Greenberger R.N. (2016) Using VSWIR microimaging spectroscopy to exploring the mineralogical diversity of HED meteorites. In: *8th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS 2016)*, 21-24 August 2016, Los Angeles, CA.
- 4) **Liu, Y.**, and Taylor, L.A., 2010. Troublesome lunar dust: Knowns and unknowns for mitigation. In Global Lunar Conference, GLUC-2010.2.8.A.2, Beijing, China. 15 pages.
- 5) Taylor, L.A., and **Liu, Y.**, 2010. Important considerations for lunar soil simulants. *12th Biennial ASCE Aerospace Division International Conference*. 15 pages.
- 6) Cole, D.M., Taylor, L.A., **Liu, Y.**, and Hopkins, M.A., 2010. Grain-scale mechanical properties of lunar plagioclase and its simulant: Initial experimental findings and modeling implications. *12th Biennial ASCE Aerospace Division International Conference*. 15 pages.

- 7) **Liu, Y.**, Taylor, L.A., Basu Sarbadhikari, A., Valley, J., et al. 2008c. Diamond genesis in the world's largest diamondiferous eclogite, part II: In-situ isotopes study of diamond and mineral inclusions. *9th International Kimberlite Conference, Abstract 00188*. 3 pages.
- 8) Taylor, L.A., **Liu, Y.**, Basu Sarbadhikari, A., Ketchum, R., Carlson, W., et al. 2008. Diamond genesis in the world's largest diamondiferous eclogite, part I: X-ray tomography and xenolith dissection. *9th International Kimberlite Conference, Abstract 00186*. 3 pages.
- 9) **Liu, Y.**, Park, J., Hill, E., Kihm, K.D., Taylor, L.A., 2006b. Morphology and physical characteristics of Apollo 17 dust particles. *10th ASCE Aerospace Division International Conference*, 15 pages.
- 10) Hill, E., Patchen, A.D., Deane, B., **Liu, Y.**, Park, J., and Taylor, L.A., 2006. Lunar simulants as feedstocks for ISRU processing: mineralogy and chemistry. *10th ASCE Aerospace Division International Conference*, 15 pages.
- 11) Park, J.S., **Liu, Y.**, Kihm, K.D., Hill, E., and Taylor, L.A., 2006. Submicron particle size distribution of Apollo 11 lunar dust. *10th ASCE Aerospace Division International Conference*, Houston, 15 pages.
- 12) Taylor, L.A., Hill, E., **Liu, Y.**, Park, J.S., and Bruce, R.W. 2006. Microwave processing Apollo soil: products for a lunar base. *10th ASCE Aerospace Division International Conference*, Houston, 15 pages.

Selected Abstracts in the Last 5 Years (**post-doc extended 2-page abstracts)

1. **Liu Y.** (2019). Internal workings of shock melting: Views from the first X-ray computed tomography (XCT) of the Tissint meteorite. *50th LPSC*, #1767.
2. **Liu Y.**, Allwood A., Hurowitz J.A., Heirweh C.M., Elam W.T. (2019) Strategy of investigating igneous rocks with the planetary instrument for X-ray lithochemistry in the Mars 2020 mission. *50th LPSC*, #1768.
3. **Liu Y.**, Ma C., Guan Y., Beckett J.R., Lingappa U.F., Webb S.M., Fisher W.W., Allwood A. (2018). Diverse fluid activities on Mars: Zinc-bearing silicate and oxide in the Martian breccia meteorites Northwest Africa (NWA) 7533. *49th LPSC*, #1045.
4. ****Hu J.**, Liu Y., Asimow P.D., Ma C., Beckett J.R., Agee C.B. (2018). Unique hydrothermal alteration on Mars: Pyrite-polycrystalline pyrrhotite assemblage in Northwest Africa N7034/7533. *49th LPSC*, #2898.
5. **Liu Y.**, Ma C., Fisher W.W., Guan Y., Webb S.M., Beckett J.R., Agee C.B. (2017a). Evidence for O₂-Rich Environments on Mars from Hydrous Mn(IV)-Oxides in Northwest Africa (NWA) 7034 and 7533 Meteorites. *48th LPSC*, #1345.
6. **Liu Y.**, Guan Y., Barrat J.-A., Taylor L.A. (2017b). Contrasting Water Chemistry in Howardites and Lunar Regolith Breccias. *48th LPSC*, #1543.
7. Day J.M.D., **Liu Y.** (2017). Clues to later impact processes on the Moon from a comparison of impact melt coats, regolith breccias, and impact melt breccias. *48th LPSC*, #2808.
8. ****Hu J.**, Asimow P. D., **Liu Y.** (2017) Low-Pressure maskelynitization of porous basalt: Implications for Basaltic Achondrites and planetary impacts. *48th LPSC*, #1812.
9. Jolliff B.L., Shearer C.K., Papanastassiou D.A., Liu Y., the MoonRise science team (2017) Why do we need samples from the Moon's South Pole-Aitken basin and what would we do with them? *48th LPSC*.
10. **Liu Y.**, Guan Y., Chen Y., Taylor, L.A. (2016a). Impact melt (agglutinitic glass) of lunar regolith: A "volatile recorder" of the lunar surface. *New View of the Moon workshop*, # 6010.
11. **Liu Y.**, Ma C., Beckett J., Flannery D., Allwood A. (2016b). Metamorphism on Mars: A view from eskolaite-bearing chromite-magnetites in Northwest Africa (NWA) 7533. *47th LPSC*, #1127.
12. **Liu Y.**, Chen Y., Guan Y. (2016c). Volatiles in a spherule and impact clasts in the Bununu howardite. *47th LPSC*, #1280.
13. ****Chen Y.**, **Liu Y.**, Asimow P. D., Guan Y. (2016) Experimental study of chemical effects during impact process: Preliminary results. *47th LPSC*, #1777.
14. Fraeman AA, Ehlmann B.L., Northwood-Smith G.W.D., **Liu Y.**, Wadhwa M., Greenberger R.N. (2016) Exploring the mineralogical diversity of HED meteorites with microimaging VSWIR spectroscopy. *47th LPSC*, #2237.

15. Jolliff, B.L., Peetro, N.E., Shearer, C.K., Cohen, B.A., **Liu, Y.**, Bottke, W.F. (2016) South Pole - Aitken basin sample-return science: Critical clues for planet formation. *47th LPSC*, #2818.
16. Warren P.H., Kohl I., Young E.D., Isa J., Morgan M., **Liu Y.** (2016) Enigmatic enclaves of silica and augite, without feldspar, in eucrites NWA 10553. *MetSoc.* #6355.
17. **Y. Liu**, D. T. Flannery, A. Allwood, et al. (2015a) Prospecting for diverse igneous rock types on Mars: PIXL on “black beauty” NWA 7533. AGU 2015 Fall meeting.
18. **Y. Liu**, C. Ma (2015b). Monazite, chevkinite-perrierite and xenotime in martian breccia meteorite NWA 7034. *46th LPSC*, #1287.
19. **Y. Liu**, C. Ma, J. Beckett (2015c). Hydrothermal alteration of martian zircons in NWA 7034/7533. *78th MetSoc*, #5080.
20. **Y. Liu**, C. Ma, Y. Chen, J. Beckett, Y. Guan (2015d). Rare-earth minerals in martian meteorite NWA 7034/7533: Evidence for fluid-rock interaction in martian crust. *78th MetSoc*, #5051.
21. **Y. Liu**, L. P. Keller, A. A. Fraeman, et al. (2015e). Agglutinates in howardite NWA 1769: Space weathering on Vesta. *46th LPSC*, #1706.
22. **J.R. Caseres, **Y. Liu**, C. Ma, et al. (2015). Trace element chemistry of Larkman Nunatuk (LAR) 12011, a new olivine-phyric shergottite. *78th MetSoc*, #5357.
23. *Y. Chen, **Y. Liu**, et al. (2015a). Surface and magmatic water signatures in EETA 79001 impact melts. *46th LPSC*, #2291.
24. *Y. Chen, **Y. Liu**, Y. Guan, C. Ma (2015b). New rock types from Mars: Trace element signatures in NWA 7034 clasts. *78th MetSoc*, #5239.
25. Y. Chen, **Y. Liu** (2015c). Impact melt pockets in Martian meteorites as recorders of impact processes on Mars. *GSA Fall Meeting*.
26. *G.H. Howarth, **Y. Liu**, et al. (2015) Heterogeneous olivine-phyric to pyroxene-phyric textures in the paired shergottites LAR12095 and LAR12240. *46th LPSC*, #1360.
27. Tait, K.T., Day, J.M.D., **Liu, Y.** (2015) Update on highly-siderophile element abundances and Re-Os isotopic systematics of martian meteorites. *46th LPSC*, #2138.
28. R.O. Green...**Y. Liu**, et al. (2015) Microimaging spectroscopy for the exploration of small bodies: first measurements of carbonaceous chondrite and HED meteorites in lab and the proposed M6 instrument for measurement in situ. *46th LPSC*, #2154.
29. H. Hui, 4 authors, **Y. Liu**, et al. (2015) SIMS analysis of water abundance and hydrogen isotope in lunar highland plagioclase. *46th LPSC*, #1927.
30. B.L. Jolliff, ... **Y. Liu**, L. Alkalai (2015) Science rationale for south pole-Aitken basin locations for sample return. *Lunar Exploration Analysis Group 2015 meeting*.
31. **C.R. Kuchka, .. **Y. Liu** (2015) A geochemical signature of martian near-surface alteration in the Tissint meteorite: Evidence from the volatile inventory in shock melt glass. *46th LPSC*, #2441.
32. L.A. Taylor, .. **Y. Liu**, N.V. Sobolev. Diamond Inclusions: OH in NAMs. *Goldschmidt 2015*.
33. ***Liu, Y.**, Ma, C. (2014a). Monazite in martian breccia meteorite NWA 7034. *8th International Mars Conference*, #1250.
34. ***Liu Y.**, Mellon M.T., Ming D.W., Morris R.V., Noble S.K. Sullivan R.J., Taylor L.A., Beaty D.W. (2014b). The value of Martian regolith to Mars returned sample science. *8th International Mars Conference*, #1371.
35. **Chen Y., **Liu Y.**, Guan Y., Eiler J. M., Ma C., Rossman G.R., Taylor L. A. (2014a). Multiple Martian volatile reservoirs preserved in Tissint and other martian meteorites. *8th International Mars Conference*, #1382.
36. *Beaty D.W., **Liu Y.**, Des Marias D. J., Borg L. E., Herd C. D. K., McLennan S.M., Allen C.C., Bass D.S., Farley K.A., and Mattingly R.L. (2014). Mars returned sample science: Scientific planning related to sample quality. *8th International Mars Conference*. #1208.
37. Jolliff, B.L., Shearer, C.K., Petro, N.E., Papanastassiou, D.A., Liu, Y., Alkalai, L. (2015) Science rationale for south pole-Aitken basin locations for sample return. *Lunar Exploration Analysis Group*.

38. *Ma C., Tschauner O., Beckett J. R., **Liu Y.**, Rossman G. R., Zuravlev K., Prakapenka V., Dera P., Sinogeikin S., Smith J., Taylor L. A. (2014). First new minerals from Mars: Discovery of Ahrensitite γ -Fe₂SiO₄ and Tissintite (Ca,Na, \square)AlSi₂O₆, two high pressure phases from the Tissint Martian meteorite. *8th International Mars Conference*. #1317.
39. **Liu Y.** (2014c). Constraining the 3.3-4.1 Ga Impacts on Vesta from Impact Glass Compositions. 2014 Goldschmidt.
40. ***Liu Y.**, Beaty D.W., Bass D.S., Mattingly R. L. (2014d). What attributes related to sample quality would be required to achieve the scientific objectives of Mars sample return (MSR)? 45th LPSC, #1460.
41. ***Liu Y.**, Guan Y., McCubbin F. M., Eiler J. M., Agee C. B., Williford K. H., Allwood A. C. (2014e) The martian surface water in breccia meteorite NWA 7034. 45th LPSC, #2368.
42. **Chen Y., Liu Y., Guan Y., Eiler J. M., Ma C., Rossman G.R., Taylor L. A. (2014b). Unusual interaction between martian surface and magmatic reservoirs: Volatiles in impact melts in the Tissint meteorite. 45th LPSC, # 2425.
43. Taylor L. A., Liu Y., Guan Y., Day J. M. D., Ma C., Hiroi T., Corder C. A., Assayag N., Rumble III D., Cartigny P., Chen Y., Hand K. P., Pieters C. M., Eiler J. M., Pokhilenko N. P., Podgornykh N. M. (2014). Metamorphism in the Chelyabinsk meteorite. 45th LPSC, #2346.
44. Ma C., Tschauner O., Liu Y., Beckett J. R., Rossman G. R., Zuravlev K., Prakapenka V., Dera P., Sinogeikin S., Smith J., Taylor L. A. (2014). Discovery of Ahrensitite γ -Fe₂SiO₄ and Tissintite (Ca,Na, \square)AlSi₂O₆: Two new high pressure minerals from the Tissint martian meteorite. 45th LPSC, #1222.
45. Pernet-Fisher J. F., Liu Y., Guan Y., Chen Y., Howarth G. H., Taylor L. A. (2014). The significance of OH contents in lunar apatites. 45th LPSC, submitted.
46. ***Liu Y.**, Day J.M.D., Ma, C., Hand, K.P., Pokhilenko, N.P., Taylor L. A. (2013d). Chelyabinsk: An ordinary chondrite from a spectacular fall in Russia. *Meteoritical Society Meeting 2013*, #1371.
47. ***Liu Y.**, Guan Y., Zhang Y., Rossman G.R., Eiler J.M., Taylor L. A. (2013c). Water on airless terrestrial bodies: Lunar case study. *GSA 2013 Fall Meeting*.
48. ***Liu Y.**, Taylor L. A., Baziotis I.P., McSween, H.Y., Bodnar, R.J., DeCarli P.S., and Melosh H. J. (2013b). Impact excavation of martian meteorite: Index from shock formed minerals. *44th LPSC Conference*, #1371.
49. ***Liu Y.**, Guan Y., Chen, Y., Zhang Y., Eiler J.M., Rossman G.R., Taylor L.A. (2013a). Hydroxyl in lunar regolith: Dependence on soil composition and maturity. *44th LPSC*, #2203.
50. ***Liu Y.**, Guan Y., Zhang Y., Rossman G.R., Eiler J.M., Taylor L.A. (2012a). Lunar surface water in agglutinates: Origin and abundances. *43rd LPSC*, #1864.
51. ***Liu Y.**, Mosenfelder, J.L., Guan Y., Rossman G.R., Eiler J.M., Taylor L.A. (2012b). SIMS analysis of water abundance in nominally anhydrous minerals in lunar basalts. *43rd LPSC*, #1866.
52. **Liu Y.**, Taylor L. A. (2012). Water, water, everywhere on the Moon. *Goldschmidt 2012* (invited talk).
53. **Liu Y.**, Goodrich C.A., Taylor L.A. (2011a). New story of shergottite EETA 79001. *74th Annual Meeting of the Meteoritical Society*, #5407..
54. ***Liu Y.**, Patchen A.D., Taylor L.A. (2011b). Lunar highland breccias MIL 090034/36/70/75: A significant KREEP component. *42nd LPSC*, #1261.
55. **Liu Y.**, Taylor L.A. (2010c). Magma ascent rates of terrestrial and lunar magmas. In Fall GSA 2010 (*Invited Talk*).
56. **Liu Y.**, Taylor L.A. (2010b). Effect of water on lunar mare basalt. In Goldschmidt 2010, #2854.
57. ***Liu Y.**, Taylor L.A. (2010a). Mischievous lunar dust: Knowns and unknowns for mitigation. In Global Lunar Conference, GLUC-2010.2.8.A.2.
58. ***Liu Y.**, Boyce J.W., Rossman G.R., Guan Y., Eiler J., Taylor L.A. (2010c). Water in lunar mare basalt: Confirmation from apatite in lunar basalt 14053. *41st LPSC*, #2649.
59. ***Liu Y.**, Spicuzza M.J., Valley J.W., Day J.M.D., Riches A.J.V., Singer K.I., Taylor L.A. (2010d). Diversity in high-Titanium lunar mare basalts? *41st LPSC*, #1669.