

CLARA S. CHAN

Department of Earth Sciences
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Education

- Ph. D. **University of California, Berkeley**
Earth and Planetary Science, 2006
Advisor: Jill Banfield
- M. S. **Stanford University**
Civil and Environmental Engineering, 1998
- B. S. **Stanford University**
Geological and Environmental Sciences, 1997

Appointments

- Professor** 2021-present
Earth Sciences, with joint appointments in Biological Sciences, Civil and Environmental Engineering, and Marine Science and Policy, University of Delaware, Newark, DE
- Associate Professor** 2015-2021
Earth Sciences (formerly named Geological Sciences), with joint appointments in Biological Sciences, Civil and Environmental Engineering, and Marine Science and Policy, University of Delaware, Newark, DE
- Visiting Associate** Spring 2016
Geological and Planetary Sciences, Caltech, Pasadena, CA
- Assistant Professor** 2009-2015
Geological Sciences, joint appointment in School of Marine Science and Policy University of Delaware, Newark, DE
- Visiting Scientist** Fall 2008
Life Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA
- Visiting Assistant Professor** 2007-2008
Geology, Bowdoin College, Brunswick, ME
- Postdoctoral Fellow** 2006-2008
Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, MA (2006-2008), Biological Sciences, University of Southern California (2008), Katrina Edwards, PI.
- Graduate Student Instructor** 2002-2003
Earth and Planetary Science, University of California, Berkeley
- Research Assistant** 2000-2006
Geomicrobiology Group, University of California, Berkeley (2001-2006), University of Wisconsin, Madison (2000-2001), Jill Banfield, PI.
- Geologist and Environmental Engineer** 1998-2000
CDM (now CDM Smith), Walnut Creek, CA

Teaching Assistant Civil and Environmental Engineering, Geological and Environmental Sciences, Stanford University	1997-1998
Physical Science Technician United States Geological Survey, Menlo Park, CA	1997
Laboratory Assistant Molecular Organic Geochemistry Laboratory and Theoretical Geochemistry Laboratory, Stanford University (PIs M. Moldowan, D. Bird)	1994, 1996-1998

Honors and Awards

Geological Society of America Geobiology & Geomicrobiology Post-Tenure Award	2019
Mineralogical Society of America Distinguished Lecturer	2017-2018
NSF CAREER Award	2012-2017
US National Academy of Sciences Kavli Fellow	2011, 2016
Excellence in Undergraduate Academic Advising and Mentoring Award nomination, University of Delaware	2011
National Science Foundation Ridge 2000 Postdoctoral Fellowship	2006-2008
Outstanding Graduate Student Instructor, for <i>Introduction to Oceans</i> , University of California, Berkeley	2004
National Defense Science and Engineering Graduate Fellowship	2001-2004
National Science Foundation Graduate Fellowship (declined)	2001
University Fellowship, University of Wisconsin	2000-2001
Field Studies Scholarship, Stanford University	1995

Research and Scholarship

Publications

(*Chan corresponding author, ^Chan lab student or postdoc)

For up-to-date citation metrics, please see [Google Scholar](#). As of Jan 2024, *h-index*=33,
#citations=4368.

In review

1. Kan, J., Lazareva, O., Oviedo-Vargas, D., McAllister S. M.^, **Chan, C. S.** Porewater microbiomes in buried wetland soils: synergic effects of water chemistry and redox gradients driven by hydrological processes, *revised and in review*.
2. Yu, Y., Martin, K. R., Le, H. T. T., Abdelgawad, A., Yang, C., Lu, G., Keffer, J. L.^, Zhang, X., Zhuang, Z., Asare-Okai, P. N. **Chan, C. S.**, Batish, M. Development of an efficient, effective, and economical technology for proteome analysis, *in review*.

Published or in press

1. Hoover, R. L.^, Keffer, J. L.^, Polson, S. W., **Chan, C. S.*** (2023) Gallionellaceae pangenomic analysis reveals insight into phylogeny, metabolic flexibility, and iron oxidation mechanisms, *mSystems* 8:e00038-23. <https://doi.org/10.1128/msystems.00038-23>
2. **Chan, C. S.***, Dykes, G. E.^, Hoover, R. L.^, Limmer, M. A., Seyfferth, A. L. (2023) Gallionellaceae in rice root plaque: metabolic roles in iron oxidation, nutrient cycling, and plant interactions, *Appl. Env. Microbiol.* 89:e00570-23. <https://doi.org/10.1128/aem.00570-23>
(highlighted by editor in Spotlight “Articles of Significant Interest”)

3. Kupper, R. J., Zhou, N.[^], **Chan, C. S.**, Thompson, A., Catalano, J. G. (2023) Rates and products of oxidation of ferrous iron in trioctahedral smectites, *Geochimica et Cosmochimica Acta* 355:282-300. <https://doi.org/10.1016/j.gca.2023.06.029>
4. Cooper, R. E., Finck, J., **Chan, C. S.**, Küsel, K. (2023) Mixotrophy broadens the ecological niche range of the iron oxidizer *Sideroxydans* sp. CL21 isolated from an iron-rich peatland, *FEMS Microbiol. Ecol.*, 99:fiac156. <https://doi.org/10.1093/femsec/fiac156>
5. Zhou, N.[^], Kupper, R. J., Catalano, J. G., Thompson, A., **Chan, C. S.*** (2022) Biological oxidation of Fe(II)-bearing smectite by microaerophilic Fe-oxidizer *Sideroxydans lithotrophicus* using dual Mto and Cyc2 iron oxidation pathways. *Environmental Science and Technology*, 56, 17443-17453. <https://doi.org/10.1021/acs.est.2c05142>
6. Zhou, N.[^], Keffer, J. L.[^], Polson, S. W., **Chan, C. S.*** (2022) Unraveling Fe(II)-oxidizing mechanisms in a facultative Fe(II)-oxidizer, *Sideroxydans lithotrophicus* ES-1 via culturing, transcriptomics, and RT-qPCR, *Appl. Env. Micro.* 88:e01595-21. <https://doi.org/10.1128/AEM.01595-21> (highlighted by editor in Spotlight “Articles of Significant Interest”)
7. Keffer, J. L.[^], McAllister, S. M.[^], Garber, A.[^], Hallahan, B. J.[^], Sutherland, M. C., Rozovsky, S., **Chan, C. S.*** (2021) Iron oxidation by a fused porin-cytochrome common to diverse iron-oxidizing bacteria. *mBio*, 12:e01074-21. <https://doi.org/10.1128/mBio.01074-21>
8. Zhou, N.[^], Luther, III, G. W., **Chan, C. S.*** (2021) Ligand effects on biotic and abiotic Fe(II) oxidation by the microaerophile *Sideroxydans lithotrophicus*, *Environmental Science and Technology*, 55:9362-9371. <https://doi.org/10.1021/acs.est.1c00497>
9. Dykes, G.[^], **Chan, C. S.**, Seyfferth, A. L. (2021) 16S rRNA gene amplicon sequencing data from flooded rice paddy mesocosms treated with different silicon-rich soil amendments, *Microbial Res. Announc.*, 10:e00178-21. <https://doi.org/10.1128/MRA.00178-21>
10. Koeksoy, E., Bayer, T., Bezuidt, O. M., **Chan, C. S.**, Emerson, D. (2021) Zetaproteobacteria pan-genome reveals candidate gene cluster for twisted stalk biosynthesis and export, *Frontiers in Microbiology* 12:679409. <https://doi.org/10.1101/2021.03.12.435129>
11. Little, C. T. S., Johannessen, K. C., Bengtson, S., **Chan, C. S.**, Ivarsson, M., Slack, J. F., Broman, C., Thorseth, I. H., Grenne, T., Bekker, A., Rouxel, O. (2021) A late Paleoproterozoic (1.74 Ga) deep-sea, low-temperature, iron-oxidizing microbial hydrothermal vent community from Arizona, USA, *Geobiology J.*, 19:228-249, <https://doi.org/10.1111/gbi.12434>
12. McAllister, S. M.[^], Vandzura, R.[^], Keffer, J. L.[^], Polson, S. W., **Chan, C. S.*** (2021) Aerobic and anaerobic iron oxidizers together drive denitrification and carbon cycling at marine iron-rich hydrothermal vents, *ISME J.* 15:1271–1286. <https://doi.org/10.1038/s41396-020-00849-y>
13. Akob, D. M., Hallenbeck, M.[^] (co-first author), Beulig, F., Fabisch, M., Küsel, K., Keffer, J. L.[^], Woyke, T., Shapiro, N., Lapidus, A., Klenk, H.-P., **Chan, C. S.*** (2020) Mixotrophic iron-oxidizing *Thiomonas* isolates from an acid mine drainage-affected creek, *Appl. Env. Micro.*, 86:e01424-20. <https://doi.org/10.1128/AEM.01424-20>
14. McAllister, S. M.[^], Polson, S. W., Butterfield, D. A., Glazer, B. T., Sylvan, J. B., **Chan, C. S.*** (2020) Validating the Cyc2 Fe oxidation pathway using meta-omics of Zetaproteobacteria Fe

mats at marine hydrothermal vents, *mSystems*. 5:e00553-19. doi: 10.1128/mSystems.00553-19
(highlighted as Editor's Choice)

15. Garber, A. I.[^], Nealson, K. H., Okamoto, A., McAllister, S. M.[^], **Chan, C. S.**, Barco, R. A., Merino, N. (2020) FeGenie: a comprehensive tool for the identification of iron genes and iron gene neighborhoods in genomes and metagenome assemblies, *Front. Microbiol.* 11:37. doi: 10.3389/fmicb.2020.00037
16. Cooper, R. E., Wegner, C.-E., McAllister, S. M.[^], Shevchenko, O., **Chan, C. S.**, Küsel, K. (2020) Draft genome sequence of *Sideroxydans* strain CL21, a Fe(II)-oxidizing bacterium, *Microbiol. Resour. Announc.* 9:e01444-19. doi: 10.1128/MRA.01444-19
17. Cron, B., Macalady, J. L., Henri, P. A.[^], **Chan, C. S.**, Cosmidis, J. (2019) Elemental sulfur formation by *Sulfuricurvum kujiense* is mediated by extracellular organic compounds. *Front. Microbiol.* 10:2710. doi: 10.3389/fmicb.2019.02710
18. McAllister, S. M.[^], Moore, R. M., Gartman, A., Luther, G. W., Emerson, D., **Chan, C. S.*** (2019) The Fe(II)-oxidizing Zetaproteobacteria: Historical, ecological, and genomic perspectives. *FEMS Microbiol. Ecol.*, 95, fiz015. doi:10.1093/femsec/fiz015 (highlighted as Editor's Choice)
19. Marnocha, C. L.[^], Sabanayagam, C., Modla, S., Powell, D., Henri, P. A.[^], Steele, A., Hanson, T. E., **Chan, C. S.*** (2019) Insights into the mineralogy and surface chemistry of extracellular biogenic S⁰ globules produced by *Chlorobaculum tepidum*. *Front. Microbiol.* 10:271. doi: 10.3389/fmicb.2019.00271
20. McAllister, S. M.[^], Moore, R. M., **Chan, C. S.** (2018) ZetaHunter, a reproducible taxonomic classification tool for tracking the ecology of the *Zetaproteobacteria* and other poorly resolved taxa, *Microbiol. Resour. Announc.* 7:e00932-18, doi:10.1128/MRA.00932-18 (highlighted on Amer. Soc. Microbiology web page and blog as MRA of the month)
21. Beam, J., Scott, J. J., McAllister, S. M.[^], **Chan, C. S.**, McManus, J., Meysman, F. and Emerson, D. (2018) Potential for biological rejuvenation of iron oxides in bioturbated marine sediments. *ISME J.*, 12:1389-1394. doi:10.1038/s41396-017-0032-6
22. Chiu, B. K.[^], Kato, S.[^], McAllister, S. M.[^], Field, E. K.[^], **Chan, C. S.*** (2017) Novel pelagic iron-oxidizing Zetaproteobacteria from the Chesapeake Bay oxic-anoxic transition zone, *Front. Microbiol.*, 8:1280. doi:10.3389/fmicb.2017.01280
23. Percak-Dennett, E., He, S., Converse, B., Konishi, H., Xu, H., Corcoran, A., Noguera, D. R., **Chan, C. S.**, Bhayyacharyya, A., Borch, T., Boyd, E.S., Roden, E. (2017) Aerobic microbial pyrite oxidation at circumneutral pH, *Geobiology*, 15:690-703. doi:10.1111/gbi.12241
24. **Chan, C. S.***, Emerson, D., Luther, III, G. W. (2016) The role of microaerophilic Fe-oxidizing microorganisms in producing banded iron formations, *Geobiology*, 14:509-528. doi: 10.1111/gbi.12192 (Top 20 most downloaded paper – “Amongst articles published between July 2016 and June 2018, your article received some of the highest downloads in the 12-months post online publication”)
25. Field, E. K.[^], Kato, S.[^], Findlay, A. J., MacDonald, D. J., Luther, III, G. W., **Chan, C. S.*** (2016) Planktonic marine iron-oxidizers drive iron mineralization under low oxygen conditions, *Geobiology*, 14:499-508. doi:10.1111/gbi.12189

26. **Chan, C. S.***, McAllister, S. M.[^], Leavitt, A. H., Glazer, B. T., Krepski, S. T.[^], Emerson, D. (2016) The architecture of iron microbial mats reflects the adaptation of chemolithotrophic iron oxidation in freshwater and marine environments, *Front. Microbiol.* 7:796. doi:10.3389/fmicb.2016.00796
27. Marnocha, C. L.[^], Powell, D. H., Levy, A. T., Hanson, T. E., **Chan, C.S.*** (2016) Mechanisms of extracellular S(0) globule production and degradation in *Chlorobaculum tepidum* via dynamic cell-globule interactions, *Microbiology*, 162:1125-1134. doi: 10.1099/mic.0.000294
28. Hanson, T. E., Bonsu, E., Tuerk, A., Marnocha, C. L.[^], **Chan, C.S.** (2016) *Chlorobaculum tepidum* growth on biogenic S(0) as the sole photosynthetic electron donor, *Env. Microbiol.*, doi: 10.1111/1462-2920.12995
29. Kato, S.[^], Ohkuma, M., Powell, D. H., Krepski, S. T.[^], Oshima, K., Hattori, M., Shapiro, N., Woyke, T., **Chan, C. S.*** (2015) Comparative genomic insights into ecophysiology of neutrophilic, microaerophilic iron oxidizing bacteria, *Front. Microbiol.*, 6:1265. doi: 10.3389/fmicb.2015.01265
30. McAllister, S. M.[^], Barnett, J. M.[^], Heiss, J. W., Findlay, A. J., MacDonald, D. J., Dow, C. L., Luther, III, G. W., Michael, H. A., **Chan, C. S.*** (2015) Dynamic hydrologic and biogeochemical processes drive microbially enhanced iron and sulfur cycling within the intertidal mixing zone of a beach aquifer, *Limnol. Oceanogr.* 60:329-345.
31. Ruocco, M. H. W., **Chan, C. S.**, Hanson, T. E., Church, T. M. (2014) Biotransformation and distribution of selenium in cultures of the marine yeast *Rhodotorula mucilaginosa*-13B, *Geomicrobiol. J.*, 31:769-778.
32. MacDonald, D. J., Findlay, A.J., McAllister, S. M.[^], Barnett, J. M.[^], Hredzak-Showalter, P., Krepski, S. T.[^], Cone, S. G.[^], Scott, J., Bennett, S. K., **Chan, C. S.**, Emerson, D., Luther, G. W. (2014) Using in situ voltammetry as a tool to search for iron oxidizing bacteria: from fresh water wetlands to hydrothermal vent sites, *Env. Sci. Process. Impact.* 16:2117-2126.
33. Sawyer, A. H., Lazareva, O., Kroeger, K., Crespo, K., Stieglitz, T., **Chan, C. S.**, Michael, H. A. (2014) Shallow stratigraphic controls on fluid and solute fluxes across the sediment-water interface of an estuary, *Limnol. Oceanogr.*, 59:997-1010.
34. Kato, S.[^], Krepski, S. T.[^], **Chan, C. S.**, Itoh, T., Ohkuma, M. (2014) *Ferriphaseelus amnicola* gen. nov., sp. nov., a neutrophilic, stalk-forming, iron-oxidizing bacterium isolated from an iron-rich groundwater seep. *IJSEM*, 64:921–925.
35. Fleming, E. J., Cetinic, I., **Chan, C. S.**, King, D. W., Emerson, D. (2014) Ecological succession among Fe-oxidizing bacteria. *ISME J.*, 8:804-815.
36. Kato, S.[^], **Chan, C. S.**, Itoh, T. Ohkuma, M. (2013) Functional gene analysis of freshwater iron-rich flocs at circumneutral pH and isolation of a stalk-forming microaerophilic iron-oxidizing bacterium. *Appl. Environ. Microbiol.*, 79:5283-5290.
37. Krepski, S. T.[^], Emerson, D., Hredzak-Showalter, P. L., Luther, G. W. and **Chan, C. S.*** (2013) Morphology of biogenic iron oxides records microbial physiology and environmental conditions: toward interpreting iron microfossils. *Geobiology*, 11:457-471.

38. Fleming, E. J., Davis, R., McAllister, S., **Chan, C. S.**, Moyer, C. L., Tebo, B., Emerson, D. (2013) Hidden in plain sight: discovery of sheath-forming, Fe-oxidizing Zetaproteobacteria at Loihi Seamount. *FEMS Microbiol. Ecol.*, 85: 116-127.
39. Saini, G. and **Chan, C. S.*** (2013) Near-neutral surface charge and hydrophilicity prevent mineral encrustation of Fe-oxidizing microorganisms. *Geobiology*, 11:191-200.
40. Krepski, S. T., Hanson, T. E., **Chan, C. S.*** (2012) Isolation and characterization of a novel biomineral stalk-forming iron-oxidizing bacterium from a circumneutral groundwater seep, *Environ. Microbiol.*, 14(7):1671-1680.
41. Singer, E., Emerson, D., Webb, E.A., Kuenen, J. G., Nelson, W. C., Barco, R. A., **Chan, C. S.**, Comolli, L. R., Heidelberg, J. F., Ferriera, S., Johnson, J., Edwards, K. J. (2011) *Mariprofundus ferrooxydans* PV-1 The first genome of a marine Fe(II) oxidizing Zetaproteobacterium, *PLoS One*, 6(9): e25386.
42. Comolli, L. R., Luef, B, **Chan, C. S.*** (2011) High resolution 2D and 3D cryo-TEM reveals structural adaptations of two stalk-forming bacteria to an Fe-oxidizing lifestyle, *Environ. Microbiol.*, 13(11): 2915-2929.
43. Yücel, M., Gartman, A., **Chan, C. S.**, Luther, III, G. W. (2011) Hydrothermal vents as a kinetically stable pyrite (FeS₂) nanoparticle source to the ocean, *Nature Geoscience*, 4: 367-371.
44. Edwards, K. J., Glazer, B. T., Rouxel, O. J., Bach, W., Emerson, D., Davis, R. E., Toner, B. M., **Chan, C. S.**, Tebo, B. M., Staudigel, H., Moyer, C. L. (2011) Ultra-diffuse hydrothermal venting supports Fe-oxidizing bacteria and massive uranium deposition at 5000m off Hawai'i. *ISME J.*, 5: 1748–1758.
45. **Chan, C. S.***, Fakra, S. C., Emerson, D., Fleming, E. J., Edwards, K. J. (2011) Lithotrophic iron-oxidizing bacteria produce organic stalks to control iron mineral growth: Implications for biosignature formation, *ISME J.*, 5: 717-727.

Prior to the University of Delaware

46. **Chan, C. S.***, Fakra, S., Edwards, D. C., Emerson, D. Banfield, J. F. (2009) Iron oxyhydroxide mineralization on microbial polysaccharides. *Geochim. Cosmochim. Acta*, 73: 3807-3818.
47. Toner, B. M., Santelli, C. M., Marcus, M. A., Wirth, R., **Chan, C. S.**, McCollom, T., Bach, W., Edwards, K. J. (2009) Biogenic iron oxide formation at mid-ocean ridge hydrothermal vents: Juan de Fuca Ridge. *Geochim. Cosmochim. Acta*, 73: 388-403.
48. Singer, S. W., **Chan, C. S.**, Zemla, A., VerBerkmoes, N. C., Hwang, M. H., Hettich, R. L., Banfield, J. F., Thelen, M. P. (2008) Characterization of cytochrome 579, an unusual cytochrome isolated from an iron-oxidizing microbial community. *Appl. Environ. Microbiol.* 74: 4454-4462.
49. Jeans, C., Singer, S. W., **Chan, C. S.**, VerBerkmoes., N. C., Hettich, R. L., Banfield, J. F., Thelen, M. P. (2008) Cytochrome 572 is a conspicuous membrane protein with iron oxidation activity purified directly from a natural acidophilic microbial community. *ISME J.*, 2: 542-50.
50. Emerson, D., Rentz, J. A., Lilburn, T. G., Davis, R. E., Aldrich, H., **Chan, C.**, Moyer, C. L. (2007) A novel lineage of proteobacteria involved in formation of marine Fe-oxidizing microbial mat communities. *PLoS One*, 2: e667.

51. **Chan, C. S.**, de Stasio, G., Welch, S. A., Girasole, M., Frazer, B., Nesterova, M., Fakra, S., Banfield, J. F. (2004) Microbial polysaccharides template assembly of nanocrystal fibers. *Science*, 303: 1656-1658.
52. Banfield, J. F., Moreau, J. W., **Chan, C. S.**, Welch, S. A. Little, B. (2001) Mineralogical biosignatures and the search for life on Mars. *Astrobiology*, 1: 447-467.

Research Funding and Support

Total: >\$7 million as PI or co-I, \$5 million to Chan Lab since 2009 at Univ. of Delaware

Current Projects

1. **Conference: 2024 Geobiology GRC/GRS**
PI Chan with Co-I Karen Lloyd
 NSF Geobiology and Low Temperature Geochemistry, EAR-2347291
 12/1/2023-3/1/2024
2. **Designing microbial biochar technologies for promoting healthy and sustainable rice production**
PI Chan with Co-Is Angelia Seyfferth and Pei Chiu
 UD Interdisciplinary Frontier Graduate and Postdoctoral Fellows Program
 9/1/2023-8/31/2024
 \$155,813 (\$42,994 to Chan)
3. **Collaborative Research: Expanding the diversity of iron oxidation mechanisms via genetics, microscopy and ‘omics in *Leptothrix***
Lead PI Chan, with co-I Jessica Keffer and collaborative PI Emily Fleming
 NSF Geobiology and Low Temperature Geochemistry, EAR-2243577
 6/2023-5/2026
4. **Durability of Steel Bridge Corrosion Protection Systems – Phase 2**
Co-I Chan with PI Jennifer McConnell
 American Institute of Steel Construction Award #23A00354
 1/1/2023-5/10/2024
5. **Biological extraction of rare earth elements inspired by processes in the Earth**
PI Chan, with collaborative PI Carolyn Ajo-Franklin
 Office of Naval Research, N000014-21-1-2361
 2021-2024
6. **Quantifying microbial roles in environmental iron oxidation via an integrated kinetics, ‘omics and metabolic modeling study**
Lead PI Chan, with co-PIs Edward O’Loughlin and Pamela Weisenhorn
 DOE Subsurface Biogeochemical Research Program, DE-SC0021010
 2020-2024
7. **Quantifying microbial roles in environmental iron oxidation via an integrated kinetics, ‘omics and metabolic modeling study**
PI Chan, with co-PIs Edward O’Loughlin and Pamela Weisenhorn
 DOE Joint Genome Institute (JGI) Biological and Environmental Research Support Science
8. **Developing a functional marker gene for Fe oxidation**
PI Chan, with co-PI Shawn Polson and collaborators Denise Akob, Kirsten Küsel
 NSF Geobiology and Low Temperature Geochemistry, EAR-1833525
 2018-2024

9. Collaborative Research: Unravelling mechanisms of Fe oxidation using synthetic biology and biochemistry

Lead PI Chan, with co-PI Sharon Rozovsky, collaborator Jeffrey Gralnick
NSF Molecular and Cellular Biosciences – Systems and Synthetic Biology, BIO-1817651
2018-2024

10. Impacts of rice cultivation practices on carbon and iron cycling: Unraveling functional microbial diversity in rice paddy rhizocompartments subject to silica-rich rice residue amendment

co-PI Chan, with Angelia Seyfferth
DOE JGI Community Sequencing Program, Small Scale Microbial/Metagenome
2017-
300 Gb DNA/RNA sequencing, assembly, annotation

Projects completed at the University of Delaware

1. Durability of steel bridge corrosion protection systems using environment-based accelerated corrosion testing

co-PI Chan, with Jennifer McConnell
American Institute of Steel Construction
2020-2021

2. Clash of cultures: Development of Fe(II)-oxidizing microbial activities upon intrusion of acid mine drainage into soil

co-PI Chan, with Shagun Sharma and John Senko
DOE JGI Community Science Program, New Investigator
2019

3. Life on clays: Evaluating Fe(II)-smectites as electron donors on the early Earth and on other planetary bodies

co-PI Chan, with PI Jeffrey Catalano
NASA Exobiology 80NSSC18K1292, WU-19-50
2018-2022

4. Coupling metabolism to mineralogical scaffolding for understanding nano-material production in metal-oxidizing bacteria

PI Chan
ONR Biosciences N00014-17-1-2640
2017-2021

5. Christina River Basin CZO: a whole watershed approach to integrating feedbacks between water, mineral and carbon fluxes in human landscapes

NSF Critical Zone Observatories, #1331856
2014-2015

6. CAREER: Rusting the Earth: the mechanisms and mineralogy of microbial Fe oxidation

PI Chan
NSF Geobiology and Low Temperature Geochemistry, #1151682
2012-2018

7. Collaborative Research: Genome-enabled investigation of S⁰ cycling in a subterranean microbial ecosystem

Collaborative PI Chan, with Project PI J. Macalady
NSF Geobiology and Low Temperature Geochemistry, #1251918
2013-2017

8. S(0) globule metabolism in *Chlorobaculum tepidum*: interdisciplinary studies of a novel microbe mineral interaction

Co-PI Chan, with PI T. Hanson
NSF Molecular and Cellular Biosciences, #1244373
2013-2017

9. Collaborative Research: Ecology of microbial mats at seamount associated Fe-rich hydrothermal vent systems

Collaborative PI Chan, with Project PI D. Emerson and collaborative PI C. Moyer
NSF Biological Oceanography, #1155290
2012-2017

10. Development of biogenicity criteria and paleoenvironmental interpretations for iron microfossils based on the morphology, physiology and behavior of modern iron-oxidizing bacteria

PI Chan with co-PIs G. Luther and D. Emerson
NASA Exobiology, NNX12AG20G
2012-2017

11. Linking microbial Fe oxidation and hydrology of groundwater-surface water interfaces at the Christina River Basin Critical Zone Observatory

Delaware NSF EPSCoR seed grant
PI Chan with co-PI Holly Michael
2012-2013

12. The effects of Fe- and S-oxidizing microorganisms on post-biostimulation permeability reduction and oxidative processes at the Rifle IFRC site

PI Chan
DOE Subsurface Biogeochemical Research, DE-DC0007116
2011-2014

13. Sequencing a neutrophilic Fe-oxidizing, biomineral stalk-forming Gallionellales strain R-1

PI Chan
DOE JGI Community Sequencing Program, CSP760
2011- annotated draft genome completed 2014

14. Biogenic elemental sulfur: integrating nanoscale imaging and molecular microbiology to understand an environmentally and biotechnologically important mineral

PI Chan with co-PI T. Hanson
UDRF Strategic Initiatives, #12A00319
2011-2013

15. Mineral biosignatures of Fe-oxidizing bacteria: towards detecting and interpreting evidence of early life on Earth and other planets

PI Chan with co-PI G. Luther
Delaware NASA EPSCoR seed grant
2011-2012

16. Surface characterization of an iron-oxidizing bacterium by atomic force microscopy

PI with postdoc Gaurav Saini
Delaware EPSCoR minigrant
2010

Prior to the University of Delaware

1. Linking genetics and mineralization of iron-oxidizing microbes at midocean ridges

NSF Ridge 2000 postdoctoral fellowship
2006-2008

2. Biomineralogy and ultrastructure of neutrophilic iron-oxidizing bacteria

Environmental Molecular Sciences Laboratory, Pacific Northwest National Lab
2006, Cryoelectron and high resolution transmission electron microscope time (2 weeks)

3. Microbial polymer templation of iron oxide mineralization in biofilms and biomimetic synthesis: a STXM investigation
2004, Advanced Light Source beamtime

Presentations

Invited seminars

1. Peking University/NSFC Mineral-Microbe Co-evolution Consortia, August 16, 2022.
2. Sorbonne Institut de minéralogie, de physique des matériaux et de cosmochimie Mineral-Life Seminar, April 12, 2022.
3. Indiana University Dept. of Biology, March 29, 2022.
4. Rice University Dept of Earth, Environmental, and Planetary Sciences, September 23, 2021.
5. Lawrence Livermore Actinides SFA Group, April 21, 2021.
6. Mineralogical Society UK Geomicrobiology Network, March 4, 2021.
7. University of Waterloo Dept. of Biology, September 18, 2020
8. University of Tübingen Geomicrobiology Group, May 19, 2020
9. University of Nevada Las Vegas School of Life Sciences, March 10, 2020.
10. Virginia Tech Dept. of Geosciences, February 3, 2020.
11. University of Southern California El Naggar group, July 8, 2019.
12. University of Minnesota Dept. of Earth Sciences, January 24 and 25, 2019.
13. University of Tübingen Geomicrobiology Group, July 26, 2018.
14. Dartmouth College Dept. of Earth Sciences, April 27, 2018.
15. Princeton University Dept. of Geosciences, April 17, 2018.
16. Pennsylvania State University Environmental Chemistry and Microbiology Student Symposium keynote, April 13, 2018.
17. Mineralogical Society of America Distinguished Lecture tour
 - a. January 2018: University of New Mexico, New Mexico Tech.
 - b. March 2018: University of Delaware, Washington and Lee, Wofford College
 - c. April 2018: Washington University St. Louis, University of Missouri
18. University of Akron Dept. of Geosciences, April 13, 2017.
19. University of California, Berkeley Banfield Geomicrobiology group, April 4, 2017.
20. Haverford College, Depts. of Chemistry and Environmental Studies, October 7, 2016.
21. Massachusetts Institute of Technology Dept. of Geological and Planetary Sciences, September 28, 2016.
22. California Institute of Technology Dept. of Geological and Planetary Sciences, October 5, 2015.
23. University of Connecticut Dept. of Civil and Environmental Engineering, November 8, 2013.
24. Bigelow Laboratory for Ocean Sciences, July 11, 2013.
25. Louisiana State University Dept. of Geology and Geophysics, April 12, 2013.
26. Carnegie Institution of Washington Geophysical Laboratory, November 5, 2012.
27. Stroud Water Research Center, PA, June 5, 2012.
28. Smithsonian Museum of Natural History Dept. of Mineral Sciences, May 3, 2012.

29. Regional Microbiology Educators 8th Annual Student Research Symposium, Swarthmore College, keynote speaker July 21, 2011.
30. Franklin Medal symposium in honor of recipient Jill Banfield, Franklin Institute/Univ. of Pennsylvania, April 27, 2011.
31. Appalachian State University Depts. of Geology and Biology seminar, April 20, 2011.
32. Pennsylvania State University Dept. of Geosciences, October 5, 2010.
33. Rutgers University, Dept. of Environmental Sciences seminar, October 2, 2009.

Invited seminars, prior to University of Delaware

34. Woods Hole Oceanographic Institution Geochemistry seminar, June 10, 2008.
35. Johns Hopkins Dept. of Earth and Planetary Sciences, April 15, 2008.
36. Maine Geological Society annual meeting keynote speaker, April 11, 2008.
37. University of Delaware Dept. of Geological Sciences, March 13, 2008.
38. University of Minnesota Dept. of Geology and Geophysics, January 28, 2008.
39. University of Connecticut Center for Integrative Geosciences, October 9, 2007.
40. Pacific Northwest National Laboratory, November 17, 2006.
41. University of Vermont Department of Geology, October 16, 2006.

Invited talks at meetings (^Chan lab member)

1. **Chan, C. S.** In rust we trust: Mechanisms and consequences of iron oxidation. Applied and Environmental Microbiology Gordon Research Conference, Mount Holyoke, MA, July 17, 2023.
2. **Chan, C. S.**, Rushworth, D. D., Zhou, N.^, Keffer, J. L.^, Hoover, R. L.^, Tothero, G.^, Awoyemi, O.^, Catalano, J. G., Kupper, R. J., Thompson, A., Microbial iron biomineralization mechanisms, kinetics, and applications for critical element recovery. American Chemical Society Spring Meeting, Indianapolis, 2023.
3. **Chan, C. S.**, Racing to rust the Earth: how iron-oxidizing bacteria thrive and meet the challenges of extracellular metal oxidation and biomineralization. Tri-Service Microbiome Consortium Topical Meeting 2022 – Extremophiles for Novel Applications online.
4. **Chan, C. S.**, McAllister, S. M.^, Keffer, J. L.^, Zhou, N.^, Hoover, R.^, Kato, S.^, Koeksoy, E., Emerson, D. The art of biomineralization. Goldschmidt Conference online, July 2021, **keynote**.
5. **Chan, C. S.**, How microbes make and break minerals, Geobiology Gordon Research Conference, Galveston, TX, January 2020.
6. **Chan, C. S.**, McAllister, S. M.^, Vandzura, R.^, Henri, P. A.^, Pavia, M.^, Polson, S. W., Macalady, J. L. How do microbes make minerals in the environment? Geological Society of America Annual Meeting, Phoenix, September 2019, **keynote/award talk**.
7. **Chan, C. S.**, McAllister, S. M.^, Vandzura, R.^, Henri, P. A.^, Pavia, M.^, Polson, S. W., Macalady, J. L. How do microbes make minerals in the environment? Tracking iron and sulfur biomineralization using meta-omics and microscopy. Goldschmidt Conference, Barcelona, August 2019, **keynote**.
8. **Chan, C. S.** How microbes make minerals: challenges and adaptations of biomineralization, Microbiology Summer School (Univ. Tübingen), Bad Urach, Germany, July 25, 2018.
9. **Chan, C. S.**, McAllister, S. M.^, Garber, A. K.^, Keffer, J.^, Rozovsky, S. How do microbes oxidize Fe? Insights from ‘omics and biochemistry, Fe biogeochemistry workshop, Lech, Austria, 2018.

10. **Chan, C. S.**, McAllister, S. M.[^], Garber, A. K.[^], Currie, A.[^] How microbes oxidize Fe(II), Goldschmidt Conference, Paris, 2017.
11. **Chan, C. S.**, McAllister, S. M.[^], Chiu, B. K.[^], Field, E. K.[^], Kato, S.[^], Polson, S. Fe(II) oxidation by Zetaproteobacteria and friends: mechanisms and influences on biogeochemical cycles, American Chemical Society, San Francisco, 2017.
12. **Chan, C. S.**, Henri, P. A.[^], Marnocha, C. L.[^], Levy, A. T., Hanson, T. E., Steele, A., Macalady, J. Elemental sulfur biomineralization by phototrophs and chemolithotrophs: model isolate and field studies, American Chemical Society, San Francisco, 2017.
13. **Chan, C. S.**, McAllister, S. M.[^] How do Fe-oxidizing microbes influence biogeochemical cycles? Perspectives from transcriptomics. Goldschmidt Conference, Yokohama, 2016.
14. **Chan, C. S.**, Kato, S.[^], McAllister, S. M.[^], Field, E. K.[^], Gartman, A., Luther, III, G. W. Using modern Fe-oxidizing microbes to unravel the evolutionary and geologic history of Fe oxidation. Goldschmidt Conference, Prague, 2015.
15. **Chan, C. S.** Microbial Fe oxidation in modern and ancient environments. American Society for Microbiology 2015 meeting, New Orleans, *plenary talk*.
16. **Chan, C. S.**, McAllister, S.[^], Leavitt, A., Emerson, D., Moyer, C. L., Glazer, B. T. Fe-oxidizing microbes are hydrothermal vent ecosystem engineers at the Loihi Seamount. American Geophysical Union Fall 2013 meeting, San Francisco.
17. **Chan, C. S.**, Krepski, S. T.[^], Hredzak-Showalter, P., Luther, G. W, and Emerson, D. Combining microscopy and voltammetry to link Fe biomineralization with geochemical conditions, American Chemical Society, New Orleans, April 2013.
18. **Chan, C. S.** Microbial Fe oxidation and biomineralization: Visualizing at the nanomineral, pore, and biofilm scales, Soil Science Society of America Conference, Cincinnati, 2012.
19. **Chan, C. S.**, Hanson, T. E., Hiras, J., Cabaniss, K. A.[^] and Brodzinski, J.[^] Challenges of cell-mineral contact during mineral formation and dissolution by Fe and S-oxidizing bacteria, Goldschmidt Conference, Montreal, Canada, 2012.
20. **Chan, C. S.** Visualizing microbial roles in Fe mineral formation, Scandem Annual meeting of the Nordic microscopy society, Bergen, Norway, 2012.
21. **Chan, C. S.**, Saini, G.[^], Krepski, S. T.[^], Hredzak-Showalter, P., and Luther, G. W. Architects of rust: Mineral precipitation and evasion strategies of Fe-oxidizing microbes. Geological Society of America 2011 meeting.
22. **Chan, C. S.** Deciphering microbial roles in mineral formation: an interdisciplinary, microscopy-based approach, Goldschmidt Conference 2010, *keynote*.

Invited talks at meetings, prior to University of Delaware

23. **Chan, C. S.**, Thelen, M., Hwang, M., and Banfield, J. F. Characterization and localization of iron-oxidizing proteins in acid mine drainage biofilms. American Geophysical Union Fall 2005 meeting.
24. **Chan, C. S.**, Fakra, S., De Stasio, G., and Banfield, J. F. Molecular mechanisms of iron oxyhydroxide biomineralization. American Geophysical Union Fall 2003 meeting.
25. **Chan, C. S.**, Nesterova, M., Welch, S. A., De Stasio, G., and Banfield, J. F. Microbial polymer templation of iron oxyhydroxides. Stanford Synchrotron Radiation Laboratory users meeting 2003.

On campus seminars and presentations

1. UD Osher Lifelong Learning Institute Environment Issues class, October 20, 2022

2. UD CEOE Ocean Currents Lecture Series, June 16, 2022
3. UD Darwin Day, February 12, 2018
4. Caltech Micromorning, May 11, 2016
5. UD Astrobiology Club, January 18, 2013
6. UD Research Foundation trustees meeting, November 14, 2012
7. Dept. of Biological Sciences seminar, September 12, 2012
8. DENIN external advisory board presentation, March 21, 2012
9. Dept. of Plant and Soil Sciences seminar, February 27, 2009
10. Dept. of Civil and Environmental Engineering seminar, March 25, 2009
11. Biogeochemistry group seminar, April 8, 2009
12. UD chapter of the American Society for Biochemistry and Molecular Biology Undergraduate Affiliate Network, October 19, 2009

Other presentations (*presenter, ^Chan lab member)

1. Rushworth, D. D.^*, Cravotta III, C. A., Boyanov, M. I., O'Loughlin, E. J., Kemner, K. M., **Chan, C. S.** 'Developing an iron biomineral method for sustainable rare earth recovery from acid mine drainage' AGU Fall Meeting 2023, San Francisco, *poster*.
2. Hoover, R.^*, Cooper, R.E., Küsel, K., **Chan, C. S.** Iron-cycling microorganisms in an iron- and organic-rich fen. Applied and Environmental Microbiology Gordon Research Conference (GRC). South Hadley, MA. July 2023, *poster*.
3. Keffer, J. L.^*, Zhou, N.^, **Chan, C. S.** Mechanisms of extracellular electron transfer in *Sideroxydans lithotrophicus* ES-1. Applied and Environmental Microbiology GRC. South Hadley, MA. July 2023, *poster*.
4. Awoyemi, O.^*, Keffer, J. L.^, **Chan, C. S.** Investigating the growth benefit of Fe and the metal-oxidizing pathway in a freshwater iron oxidizer, *Leptothrix cholodnii* SP-6. Applied and Environmental Microbiology GRC. South Hadley, MA. July 2023, *poster*.
5. Tothero, G. K.^*, Farag, I. F., Kaplan, D. I., Weisenhorn, P., **Chan, C. S.** *Leptothrix ochracea* Genomes Reveal Potential for Mixotrophic Growth by Oxidation of Iron and Organic Carbon. Department of Energy Environmental Systems Science PI Meeting. May 2023, *poster*.
6. Tothero, G. K.^*, Farag, I. F., Kaplan, D. I., **Chan, C. S.** Contributions of *Leptothrix ochracea* mats to iron and carbon cycling in a terrestrial wetland. Mid-Atlantic Geobiology Symposium, Newark, DE, February 2023, *talk*.
7. Hoover, R.^*, Cooper, R.E.; Küsel, K., **Chan, C. S.** Iron-cycling microbes in an organic-rich fen. Mid-Atlantic Microbiology Symposium. Newark, Delaware. February 2023, *poster*.
8. **Chan, C. S.***, Tothero, G.^, Awoyemi, O.^, Hoover, R.^, Kaplan, D., O'Loughlin, E., Weisenhorn, P. Microbial iron oxidation in metal-rich wetlands: an integrated kinetics and omics study. Goldschmidt 2022, *talk*.
9. **Zhou, N.^**, Kupper, R. J., Catalano, J. G., Thompson, A., **Chan, C. S.** Oxidation of Fe(II)-bearing smectite by *Sideroxydans lithotrophicus* in low oxygen conditions. Goldschmidt 2022, *talk*.
10. Keffer, J. L.^*, McAllister, S. M.^, Garber, A. I.^, Hallahan, B. J.^, Sutherland, M. C., Rozovsky, S., **Chan, C. S.** Iron oxidation by a fused cytochrome-porin common to diverse iron-oxidizing bacteria. ASM Microbe Conference 2022, *talk*.

11. Hoover, R.^{^*}, **Chan, C. S.**, and Keffer, J.[^] Understanding the Gallionellaceae Through Phylogeny, Metabolic Potential, and Evolutionary History. ASM Microbe Conference.2022. *poster*.
12. Tothero, G.[^], Kaplan, D., O'Loughlin, E., Weisenhorn, P., **Chan, C. S.**, Microbial contributions to environmental iron oxidation at the Savannah River Site. ASM Microbe Conference 2022. *poster*.
13. Zhou, N.^{^*}, Luther, G. W., Keffer, J.[^], Polson, S., **Chan, C. S.** The molecular mechanisms and organic effects on microaerophilic Fe(II) oxidation by *Sideroxydans lithotrophicus*. American Chemical Society Spring meeting 2022 online, *talk*.
14. Hoover, R.^{^*}, **Chan, C. S.**, and Keffer, J.[^] Who are the Gallionellaceae? Finding answers through phylogeny, metabolic potential, and evolutionary history. MidAtlantic Geobiology Symposium online 2022, *talk*.
15. Zhou, N.^{^*}, Keffer, J.[^], Polson, S., **Chan, C. S.** Unravelling *Sideroxydans lithotrophicus* ES-1 Fe(II)-oxidizing pathway using transcriptomics and RT-qPCR. Goldschmidt 2021 online, *talk*.
16. Kupper, R. J.*, Zhou, N.[^], **Chan, C. S.**, Catalano, J. G. Fate of trace metals in ferrous smectites following iron oxidation. Goldschmidt 2021 online, *flash talk*.
17. Zhou, N.^{^*}, Keffer, J.[^], Polson, S., **Chan, C. S.** Unravelling *Sideroxydans lithotrophicus* ES-1 Fe(II)-oxidizing pathway using transcriptomics and RT-qPCR. Penn Geobiology Symposium, February 2021, *talk*.
18. Keffer, J.^{^*}, **Chan, C. S.** Functional verification of iron oxidase activity for Cyc2 from neutrophilic iron-oxidizing bacteria. Penn Geobiology Symposium, February 2021, *flash talk*.
19. Zhou, N.^{^*}, Kupper, R., Catalano, J., Hanson, T., **Chan, C. S.** Investigating iron oxidation pathways using a metabolically versatile Fe-oxidizing bacterium- *Sideroxydans lithotrophicus* ES-1. ACS Spring meeting, March 2020 (cancelled due to COVID-19).
20. Hoover, R. L.^{^*}, **Chan, C. S.** Metabolic plasticity of iron oxidizing bacteria in the presence of organic acids. Geobiology Gordon Research Conference, Galveston, TX, January 2020, *poster*.
21. Michael, H. A.*, Kim, K. H., Heiss, J., Guimond, J., Ullman, W. J., **Chan, C. S.**, McAllister, S.[^] Dynamic hydrologic and biogeochemical hotspots along coastlines as potential targets for biogeophysical investigation. American Geophysical Union Fall meeting, San Francisco, December 2019, *talk*.
22. **Chan, C. S.*** Coupling metabolism to mineralogical scaffolding for understanding nano-material production in metal-oxidizing bacteria, Office of Naval Research (ONR) Bioscience Program Review, November 2019, *talk*.
23. **Chan, C. S.***, McAllister, S. M.[^], Vandzura, R.[^], Polson, S. W. Microbial niches and elemental cycling in hydrothermal vent Fe mats. Goldschmidt Conference, Barcelona, August 2019, *talk*.
24. Keffer, J. L.^{^*}, McAllister, S. M.[^], Rozovsky, S., **Chan, C. S.** What is the iron oxidase in neutrophilic iron-oxidizing bacteria? American Society of Microbiology Microbe, San Francisco, June 2019, *poster*.
25. Vandzura, R.^{^*}, McAllister, S.[^], Polson, S., **Chan, C. S.** Microbial and viral roles in hydrothermal vent Fe mat elemental cycling and ecology at the Loihi Seamount, American Society of Microbiology Microbe, San Francisco, June 2019, *poster*.
26. Hallenbeck, M.^{^*}, Zhou, N.[^], Akob, D., Küsel, K., **Chan, C. S.** Comparative genomic analysis of *Thiomonas* isolates from acid mine drainage, AGU Fall Meeting, Washington, D. C., December 2018, *poster*.

27. McAllister, S. M.^{^*}, Polson, S., Sylvan, J., Glazer, B. T., **Chan, C. S.** Meta-omic approaches at mid-ocean hydrothermal vents reveal biogeochemical roles of the Zetaproteobacteria in Fe mineralizing ecosystems, AGU Fall Meeting, Washington, D. C., December 2018, *talk*.
28. Pavia, M. J.^{^*}, Henri, P. A.[^], Polson, S., Macalady, J. L., **Chan, C. S.** Metagenomic and metatranscriptomic analysis of S(0) rich microbial community reveals genetic diversity and ecological success of the genus *Sulfurovum*, AGU Fall Meeting, Washington, D. C., December 2018, *poster*.
29. Vandzura, R.^{^*}, McAllister, S.[^], Polson, S., **Chan, C. S.** Microbial and viral roles in hydrothermal vent Fe mat elemental cycling and ecology at the Loihi Seamount, AGU Fall Meeting, Washington, D. C., December 2018, *poster*.
30. Zhou, N.^{^*}, McAllister, S.[^], Polson, S., **Chan, C. S.** Developing model neutrophilic iron-oxidizing microbes for exploring Fe oxidation pathways by transcriptomics, AGU Fall Meeting, Washington, D. C., December 2018, *poster*.
31. Garber, A.^{^*}, McAllister, S. M.[^], Hallahan, B. J.[^], Keffer, J.[^], Rozovsky, S., **Chan, C. S.** Fe oxidation by a fused porin-cytochrome common to diverse Fe-oxidizing bacteria. Northeast Geobiology Symposium, Woods Hole, MA, April 2018, *talk*.
32. Vandzura, R.*, McAllister, S., Polson, S., **Chan, C. S.** Bacteriophage in Hydrothermal Vent Iron Mats: a metagenomic analysis. Northeast Geobiology Symposium, Woods Hole, MA, April 2018, *poster*.
33. **Chan, C. S.*** Coupling metabolism to mineralogical scaffolding for understanding nano-material production in metal-oxidizing bacteria, ONR Bioscience Program Review, March 2018, *talk*.
34. Dykes, G. E.^{^*}, **Chan, C. S.**, Seyfferth, A. L. Silicon addition to rice paddy soils impacts arsenic biogeochemical cycling: implications for global food security. Joint Genome Institute Genomics of Energy and Environment Meeting, March 2018, *poster*.
35. **Chan, C. S.***, McAllister, S. M.[^], Garber, A.[^], Hallahan, B. J.[^], Rozovsky, S. Fe oxidation by a fused porin-cytochrome common to diverse Fe-oxidizing bacteria. Geobiology Gordon Research Conference, January 2018, *poster*.
36. **Chan, C. S.***, McAllister, S. M.[^], Polson, S. W. Using marine Fe mat meta-omics to gain insights into Zetaproteobacteria functional diversity, ecological interactions, and biogeochemical roles, International Symposium on Chemosynthesis-Based Ecosystems, Woods Hole, August 2017, *talk*.
37. Henri, P. A.^{^*}, **Chan, C. S.**, Macalady, J., Webb, S., Steele, A., Elucidating the role of chemolithotrophic sulphide-oxidizers in the formation of S(0) deposits, Goldschmidt Conference, Paris, 2017, *poster*.
38. Field, E. K.^{^*}, Hoppes, K.[^], Kim, K., Michael, H. A., Hanson, T. E., **Chan, C. S.**, Multi-talented microbes drive Fe, S, N, and C cycling in an intertidal coastal aquifer: a metagenomic study, Goldschmidt Conference, Paris, 2017, *talk*.
39. Marnocha, C. L.^{^*}, Henri, P. A.[^], Sabanayagam, C., Modla, S., Powell, D., Hanson, T. E., Steele, A., **Chan, C. S.** What makes biogenic sulfur special? Insights into surface chemistry and mineralogy of sulfur globules, Goldschmidt Conference, Paris, 2017, *poster*.
40. Emerson D.*, **Chan C. S.**, Barco R. Implications for extracellular iron-oxidation and production of biogenic iron oxides by Fe-oxidizing bacteria, Goldschmidt Conference, Paris, 2017, *talk*.
41. Levy, A. T.*, Marnocha, C.[^], **Chan, C. S.**, Lee, K., Hanson, T. New insights into the physical characteristics and (bio)chemical make-up of S⁰ globules from *Chlorobaculum tepidum*. Applied and Environmental Microbiology Gordon Research Conference, 2017, *talk*.

42. McAllister, S. M.^{^*}, Sylvan, J., Polson, S., **Chan, C. S.** Meta-omics of hydrothermal Fe microbial mats reveal Zetaproteobacteria functional diversity and interactions within the mat microbial community, Applied and Environmental Microbiology Gordon Research Seminar, 2017, *poster*.
43. Pavia, M. J.^{^*}, Henri, P. A.[^], Macalady, J. L., Polson, S., **Chan, C. S.** Colonization of sulfur oxidizing biofilms in the Frassasi Cave System, a Meta-omics approach. Astrobiology Graduate Conference, 2017, *poster*.
44. Garber, A.^{^*}, McAllister, S., Hallahan, B., Rozovsky, S., **Chan, C. S.** Cytochrome Cyc2: A putative Fe oxidase and possible marker for Fe-oxidizing bacteria. Astrobiology Graduate Conference, 2017, *poster*.
45. Chiu, B. K.^{^*}, Field, E. K.[^], Kato, S.[^], McAllister, S. M.[^], Luther, III, G. W., **Chan, C. S.** Novel Fe-oxidizing Zetaproteobacteria floating in the Chesapeake: kinetics and genomic insights into microbial Fe cycling in a stratified marine water column, American Geophysical Union Fall 2016 meeting, *poster*.
46. **Chan, C. S.*** Kinetics, transcriptomics and biochemical approaches to understanding neutrophilic Fe oxidation, Telluride Iron Biogeochemistry Workshop August 2016, *talk*.
47. McAllister, S. M.^{^*}, Polson, S., **Chan, C. S.** Metatranscriptomics of Zetaproteobacteria at marine hydrothermal vents: ecological and biogeochemical interactions, ISME Conference, Montreal, August 2016, *poster*.
48. Marnocha, C. L.[^], Hanson, T. E., Powell, D. H., Sabanayagam, C. R., Tuerk, A. L., **Chan, C. S.*** Elemental sulfur biomineralization and dissolution by the phototroph *Chlorobaculum tepidum*, ISME Conference, Montreal, August 2016, *poster*.
49. Field, E. K.^{^*}, Hoppes, K. L.[^], Kim, K. H. K., Michael, H. A., Hanson, T. E., **Chan, C. S.** Just another Day at the Beach? The Microbial Role in Iron and Sulfur Cycling in a Beach Aquifer System, ISME Conference, Montreal, August 2016, *poster*.
50. McAllister, S. M.^{^*}, Polson, S., **Chan, C. S.** Metatranscriptomics of Zetaproteobacteria at marine hydrothermal vents: ecological and biogeochemical interactions, Southern California Geobiology Conference, May 2016, *poster*.
51. Chiu, B. K.^{^*}, Field, E. K.[^], Kato, S.[^], **Chan, C. S.** Using kinetics to demonstrate a novel iron-oxidizing bacteria's potential link to the deposition of banded iron formations Northeastern Geobiology Conference, April 2016, *poster*.
52. Marnocha, C. L.[^], Hanson, T. E., Powell, D. H., Sabanayagam, C. R., Tuerk, A. L., **Chan, C. S.*** Elemental sulfur biomineralization and dissolution by the phototroph *Chlorobaculum tepidum*, Kavli Frontiers in Science symposium, Potsdam Germany, March 2016, *poster*.
53. Marnocha, C. L.[^], Hanson, T. E., Powell, D. H., Sabanayagam, C. R., Tuerk, A. L., **Chan, C. S.*** Elemental sulfur biomineralization and dissolution by the phototroph *Chlorobaculum tepidum*, Geobiology Gordon Research Conference, Galveston, February 2016, *poster*.
54. McAllister, S. M.[^], Polson, S. W., Glazer, B. T., **Chan, C. S.** Using metatranscriptomics to understand the roles of Fe(II)-oxidizing microbes in marine hydrothermal vents. American Geophysical Union Fall 2015 meeting, *poster*.
55. **Chan, C. S.**, McAllister, S. M.[^], Leavitt, A. H., Glazer, B. T., and Emerson, D. Using intact iron microbial mats to gain insights into mat ecology and geochemical niche at the microbial scale. American Geophysical Union Fall 2015 meeting, *poster*.
56. **Chan, C. S.***, Field, E. K., Kato, S., Gartman, A., Emerson, D., and Luther, III, G. W. The role of microaerophilic Fe-oxidizing microorganisms in producing banded iron formations, Geological Society of America conference, Baltimore, November 2015, *poster*.

57. Hoppes, K. A.^{^*}, **Chan, C. S.**, Cabaniss, K. A.[^], Williams, K. H., Moore, M., Caplan, J., Michael, H. A., Caplan, J., Microbial iron oxidation and contribution to Fe oxide coatings in aquifer sediment, Geological Society of America conference, Baltimore, November 2015, *poster*.
58. Marnocha, C. L.^{^*}, Powell, D. H., Sabanayagam, C. R., Tuerk, A. L., Hanson, T. E., **Chan, C. S.** Spatial relationships and physical dynamics of *Chlorobaculum tepidum* and extracellular S(0) globules, Geological Society of America conference, Baltimore, November 2015, *talk*.
59. Marnocha, C. L.^{^*}, Hanson, T. E., Powell, D. H., Sabanayagam, C. R., **Chan, C. S.** *C. tepidum*-S⁰ globule interactions: some attachment required, Goldschmidt conference, Prague, August 2015, *poster*.
60. Field, E. K.^{^*}, Kato, S., Findlay, A. J., MacDonald, D. J., Luther, III, G. W., **Chan, C. S.** Microaerophilic iron-oxidizing bacteria and oxygenic phototrophs in the Chesapeake Bay: implications for microbial roles in the production of ancient iron formations, Goldschmidt conference, Prague, August 2015, *talk*.
61. Kato, S.^{^*}, Moriya, O., **Chan, C. S.** Genetic markers for neutrophilic iron oxidation and biomineralization determined by comparative genomics, Applied and Environmental Microbiology Gordon Conference, July 2015.
62. McAllister, S. M.^{^*}, Sylvan, J. B., **Chan, C. S.** Comparative metatranscriptomics of marine Fe microbial mats: toward determining the mechanism(s) of neutrophilic Fe(II) oxidation and the activity of other biogeochemical cycles in marine Fe-rich habitats, Applied and Environmental Microbiology Gordon Conference, July 2015.
63. Field, E. K.^{^*}, Kato, S., Findlay, A. J., MacDonald, D. J., Luther, III, G. W., **Chan, C. S.** Microaerophilic iron-oxidizing bacteria and oxygenic phototrophs in the Chesapeake Bay: implications for microbial roles in the production of ancient iron formations, Astrobiology Science Conference, June 2015, *talk*.
64. McAllister, S. M.^{^*}, Leavitt, A. H., Kato, S.[^], Sylvan, J. B., Emerson, D., **Chan, C. S.** Iron microbial mat morphological and genetic signatures: clues to the ecology and mechanisms of chemolithotrophic iron-oxidizers in freshwater and marine environments, Astrobiology Science Conference, June 2015, *talk*.
65. Marnocha, C. L.^{^*}, **Chan, C. S.**, Hanson, T. E. *C. tepidum*-S⁰ globule interactions: some attachment required, Northeast Geobiology Symposium, February 2015, *poster*.
66. Field, E. K.^{^*}, Kato, S.[^], Findlay, A. J., MacDonald, D. J., Luther, III, G. W., **Chan, C. S.** Microaerophilic Iron-Oxidizing Bacteria and oxygenic phototrophs in the Chesapeake Bay, an Ancient Ocean Analog, Northeast Geobiology Symposium, February 2015, *talk*.
67. McAllister, S. M.^{^*}, Barnett, J. M.[^], Heiss, J. W., Findlay, A. J., MacDonald, D. J., Dow, C. L., Luther, III, G. W., Michael, H. A., and **Chan, C. S.*** (2015) Dynamic hydrologic and biogeochemical processes drive microbially enhanced iron and sulfur cycling within the intertidal mixing zone of a beach aquifer, Northeast Geobiology Symposium, February 2015, *poster*.
68. Kato, S.^{^*}, Chan, C. S., Ohkuma M. Genomic insights into ecophysiology of freshwater neutrophilic biomineral-producing iron-oxidizing bacteria, Northeast Geobiology Symposium, February 2015, *poster*.
69. **Chan, C. S.***, Cabaniss, K. A.[^], Williams, K. H., Moore, M., Michael, H. A., Caplan, J., Lin, C.[^], Fe-oxidizing microorganisms in microscopic model aquifer systems: feedbacks between flow and biomineralization, Ninth International Symposium on Subsurface Microbiology, October 2014, *talk*.
70. McAllister, S. M.[^], Barnett, J. M.[^], Findlay, A., MacDonald, D., Luther G. W., Michael, H. A., and **Chan, C. S.*** Interplay between Fe- and S-cycling microbial communities, geochemistry, and

hydrology in the intertidal mixing zone of a beach aquifer, Ninth International Symposium on Subsurface Microbiology, October 2014, *poster*.

71. Percak-Dennett, E., Roden, E.*, Xu, H., Konishi, H., **Chan, C.**, Bhattacharyya, A., Borch, T. Microbial chemolithoautotrophic oxidation of pyrite at neutral pH. Goldschmidt Conference, June 2014, *invited talk*.
72. Vander Roost, J.*, **Chan, C.**, Pedersen, R. B., Steen, I. H., Thorseth, I., Dahle, H. Distribution of Iron Oxidizers in the Jan Mayen Vent Field, Biosignatures across space and time: Joint meeting of the Nordic Network of Astrobiology and the Centre of Geobiology, May 20-22, 2014.
73. McAllister, S. M.^*, Barnett, J. M.^, Findlay, A., MacDonald, D., Luther G. W., Michael, H. A., and **Chan, C. S.** Interplay between iron- and sulfur- cycling microbial communities and geochemistry along ecosystem gradients in the intertidal mixing zone of a beach aquifer. Ocean Sciences meeting 2014, *talk*.
74. **Chan, C. S.***, Lin, C., Kan, J., McAllister, S. M., Krepski, S. T., Lazareva, O. A novel Fe(II)-oxidizing Epsilonproteobacterium isolated from a streambank aquifer. American Geophysical Union Fall 2013 meeting, *poster*.
75. Sawyer, A. H.*, Lazareva, O., **Chan, C. S.**, Crespo, K., Stieglitz, T. C., and Michael, H. A. Shallow stratigraphic controls on fluid and solute fluxes across the sediment-water interface of an estuary, American Geophysical Union Fall 2013 meeting, *invited poster*.
76. Cabaniss, K. A.^, **Chan, C. S.***, Moore, M., Lin, C.^, Williams, K. H. Fe-oxidizing microorganisms in microscopic model aquifer systems: toward understanding post-biostimulation permeability reduction and oxidative processes at the Rifle IFRC site, DOE TES/SBR PI meeting, May 14, 2013, *poster*.
77. **Chan., C. S.*** and Lin, C. Exploring the diversity and distribution of aerobic Fe-oxidizing microorganisms in groundwater-surface water transition zones. Monte Verità Conference on Iron Biogeochemistry 2013, *talk*.
78. Krepski, S. T.^, Hredzak-Showalter, P. L., Emerson, D., Luther, G. W., **Chan, C. S.***, Fe-oxidizing microbial biosignatures record microaerobic environments, Geobiology Gordon Research Conference 2013, *poster*.
79. **Chan, C. S.*** Microbial Fe oxidation and mineral formation in modern and ancient environments, Telluride Iron Biogeochemistry Workshop August 2012, *talk*.
80. Krepski, S. T.^*, Hredzak-Showalter, P. L., Emerson, D., Luther, G. W., **Chan, C. S.**, Biogenicity of iron microfossils based on the morphology, physiology, and behavior of modern iron-depositing bacteria, Goldschmidt Conference June 2012, *poster*.
81. Hredzak-Showalter, P. L.*, S. T. Krepski.^, G. W. Luther III, **C. S. Chan** and D. E. Emerson. The Coupling of Voltammetric Microelectrodes with Optical Microscopy: A Novel Combination as Applied to the Study of Neutrophilic Iron Oxidizers, Goldschmidt conference, Montreal, Canada, June 27, 2012, *talk*.
82. Hiras, J., Hess, D., **Chan, C. S.** and Hanson, T.E.* Small molecules with big roles in phototrophic bacteria. BIOFUME: Biodiversity and functioning of marine ecosystems, 3rd Banyuls-Delaware Workshop. Observatoire Océanologique, Banyuls sur Mer, France, *talk*.
83. **Chan, C. S.***, Cabaniss, K. A.^, Lin, C.^, Williams, K. H. Isolation of Fe-oxidizing microorganisms from the Rifle IFRC site: toward understanding post-biostimulation permeability reduction and oxidative processes DOE SBR PI meeting, May 1, 2012, *poster*.
84. Luther, G. W.*, A. Gartman, M. Yücel and **C. S. Chan**. Metal sulfide nanoparticles in the marine environment, meeting of the American Chemical Society, San Diego, CA, March 27, 2012, *invited talk*.

85. Gartman, A.* , M. Yücel, **C. S.Chan** and G. W. Luther, III. Pyrite nanoparticles from hydrothermal vents are a potential source of iron to the ocean, 2012 Ocean Sciences Meeting, Salt Lake City, UT, February 23, 2012.
86. Krepski, S. T.^*, Hredzak-Showalter, P. L., Luther, G. W., and **Chan, C. S.** Micro-scale morphology and texture of biogenic iron oxide mats provide a physical record of microbial physiology and oxygen conditions. American Geophysical Union Fall Meeting, December 2011, *poster*.
87. Saini, G.^ and **Chan, C. S.*** Cell surface characteristics enable encrustation-free survival of neutrophilic iron-oxidizing bacteria. American Geophysical Union Fall Meeting, December 2011, *poster*.
88. **Chan, C. S.***, Saini, G.^, Krepski, S. T.^, Hredzak-Showalter, P., and Luther, G. W. Architects of rust: Mineral precipitation and evasion strategies of Fe-oxidizing microbes. National Academies of Science Kavli Frontiers of Science meeting, Shenzhen, China, November 2011, *poster*.
89. **Chan, C. S.***, Krepski, S. T.^, and Saini, G. S.^ A new Gallionellales isolate: a model system for comparative studies of Fe-oxidizer physiology and biomineralization, Goldschmidt Conference, Prague, August 2011, *talk*.
90. Gartman, A.* , M. Yücel, **C. S. Chan** and G. W. Luther, III. Hydrothermal emissions of pyrite nanoparticles, presented at the 242nd ACS National Meeting that will be held in Denver, Colorado, August 28, 2011.
91. Krepski, S. T.^* and **Chan, C. S.** Biomineralization by a newly-isolated stalk-forming Fe-oxidizing bacterium: towards interpretation of putative Fe microfossils, American Geophysical Union Fall Meeting, December 2010, *poster*.
92. **Chan, C. S.*** Biomineralization by neutrophilic Fe-oxidizing microorganisms, Telluride Iron Biogeochemistry Workshop 2010, *talk*.
93. **Chan, C. S.***, Comolli, L. R., Luef, B. and Krepski, S. T.^ Ultrastructure and reactivity of Fe-oxidizer microbial surfaces: Implications for controlling mineralization, ISME Conference 2010, *talk*.
94. **Chan, C. S.*** and Comolli, L. R. Visualizing cell surfaces and biominerals in 3D: cryo-electron microscopy and tomography of iron-oxidizing bacteria, Goldschmidt Conference 2009, *talk*.

Other presentations, prior to University of Delaware

95. **Chan, C. S.***, Fleming, E. J., Emerson, D., and Edwards, K. J. Linking microbial ultrastructure and physiology to iron depositional processes in deep sea hydrothermal environments. American Geophysical Union Fall 2008 meeting, *poster*.
96. **Chan, C. S.***, Emerson, D., Fakra, S., and Edwards, K. J. Iron oxidation and biomineralization by *Mariprofundus ferrooxydans*, a deep-sea microaerophilic lithoautotroph. American Geophysical Union Fall 2007 meeting, *poster*.
97. **Chan, C. S.***, Emerson, D., Fakra, S., and Edwards, K. J. Organic-mineral stalk formation by the marine iron-oxidizing bacterium *Mariprofundus ferrooxydans*. Interridge Theoretical Institute 2007, *talk and poster*.
98. **Chan, C. S.***, Emerson, D., Fakra, S., and Edwards, K. J. Formation of biomineralized stalks by a marine iron-oxidizing bacterium. Goldschmidt Conference 2007, *poster*.
99. **Chan, C. S.***, Emerson, D., and Edwards, K. J. Biomineralogy and morphology of the marine iron-oxidizing bacterium *Mariprofundus ferrooxydans*. American Geophysical Union Fall 2006 meeting, *talk*.

100. **Chan, C. S.***, Fakra, S., and Banfield, J. F. Iron oxyhydroxide mineralization by microbes in terrestrial environments. American Geophysical Union Fall 2004 meeting, *poster*.
101. **Chan, C. S.***, Nesterova, M., Welch, S. A., De Stasio, G., and Banfield, J. F. Microbial polymer templation of iron oxyhydroxides. Goldschmidt conference 2003, *talk*.
102. **Chan, C. S.*** and Banfield, J. F. Roles of microbial communities and polymers in iron oxide mineralization. American Society for Microbiology 2003 General Meeting, *poster*.
103. **Chan, C. S.*** and Banfield, J. F. Microbial communities associated with biogenic iron oxide mineralization in circumneutral pH environments. American Geophysical Union Fall 2002 meeting, *poster*.
104. **Chan, C. S.***, Skatvold, A. M., Labrenz M., Welch S. A., and Banfield, J. F. Phylogenetic analysis of microbial populations associated with iron cycling in the Piquette Mine in Tennyson, Wisconsin. American Geophysical Union Fall 2001 meeting, *poster*.

Other professional meetings and workshops attended

National Center for Faculty Development and Diversity Coach Training for Faculty Success Program, October-November, 2019

Earth Science Womens Network workshop on Building Leadership and Management Skills for Success, June 10-12, 2013

NSF-NNIN Workshop on Nano-Enabled Sensing Microsystems for Geosciences, February 4-5, 2010

NAGT Early Career Geoscience Faculty workshop, June 14-18, 2009

The Institute for Genomic Research (TIGR) Prokaryotic genome annotation course, Oct. 10-12, 2006

Molecular Geomicrobiology, GS/MSA short course, Berkeley, CA, Dec. 2-4, 2006

Hawaii Astrobiology Winter School, University of Hawaii NASA Astrobiology Institute, Jan. 10-21, 2005

Preparing for an Academic Career in the Geosciences, NAGT/NSF Professional Development Workshop, Aug. 15-17, 2003

Applications of Synchrotron Radiation in Low-Temperature Geochemistry and Environmental Science, GS/MSA short course, Monterey, CA, Dec. 4-5, 2002

Cruises and Field Experience

Cruises

2013 August and 2014 August, Chesapeake Bay, R/V Sharp (5+6 days), chemocline sampling for Fe and S-oxidizing microbes (w/ E. Field and S. Kato in 2014)

2013 March, Loihi Seamount, Hawaii, R/V Thompson, Jason submersible ROV, and Sentry AUV (17 days), marine Fe microbial mat survey/sampling

2008 October, Loihi Seamount, Hawaii, R/V Thompson and Jason submersible ROV (11 days), FeMO (Fe Microbial Observatory), Fe mat and hydrothermal vent survey and sampling

2006 October-November, Loihi Seamount, Hawaii, R/V Melville and Jason submersible ROV (20 days), FeMO vent survey and sampling

Other cruises with student participation:

2017 March-April, East Pacific Rise, marine Fe oxidizer and endosymbiont sampling (B. Chiu)

2014 November-December, Eifuku and nearby seamounts, Marianas Arc, marine Fe microbial mat survey/sampling (S. McAllister)

2012 October-November, Mid-Atlantic Ridge Rainbow, Snake Pit, and TAG sites, R/V Knorr (24 days, S. McAllister)

2011 August, Chesapeake Bay, R/V Sharp (5 days, S. Krepski)

Other field experience

2022 January and 2021 May, Savannah River Site, Aiken, SC, wetland and stream iron microbial mat/floc sampling and geochemistry

2021 August, Acid Mine Drainage sites, near Pottstown, PA, iron microbial mat and water sampling

2013 May-October, Cape Shores, Lewes, DE, intertidal zone groundwater microbiological and geochemical sampling

2012 July, Rifle aquifer, CO, groundwater microbiological and geochemical sampling

2011 August, 2016 July, Frasassi Cave system, Italy, sulfur microbial mat sampling

2009-2012 White Clay and Christina Creeks, DE and Boothbay, ME, Fe microbial mat sampling and geochemical profiling

2000-2005 Piquette Mine (Tennyson, WI) and Richmond Mine (Iron Mountain, near Redding, CA), Geochemical and microbiological sampling and field-based geochemical analyses

1998-2000 Groundwater well installation and monitoring, soil sampling and core logging, various sites in San Francisco and Los Angeles areas, CA

1994-1995 Summer field camps, geologic mapping, Snake Range, NV, Eastern Sierras and White-Inyo Range, CA

Teaching and Advising

Courses Taught (at Univ. of Delaware unless otherwise specified)

<u>Course</u>	<u>Units</u>	<u>Term</u>
GEOL 202 Earth Materials (co-taught with S. McGearly)	4	F2012, F2013
GEOL 300 Earth's Materials I: Minerals	4	F2010
GEOL 367 Independent Study (Microbial Biosignatures)	2	Win2011
GEOL 401 Senior Seminar: Topics in Geoscience	3	Sp2012
GEOL/MAST 445/645 Geomicrobiology	3	F2009, F2011, F2013, F2015, F2017, F2018, F2021
GEOL 601 Geological Sciences at Delaware (introductory course for new graduate students)	1	F2019, F2020
GEOL 666 Proposal writing	1	Sp2015
GEOL 666 Advanced Mineralogy	4	F2012
GEOL 667 Methods in Geomicrobiology	3	Sp2010, F2012
GEOL 604/MAST600 Writing in Geosciences	2-3	Sp2011, Sp2012, Sp2013, Sp2014, Sp2015, Sp2017,

		Sp2019, Sp2020, Sp2021, Sp2022, Sp2023
GEOL 868 Special Problems (Advanced Mineralogy; O ₂ in Earth history and microbial physiology)	2-4	F2010
MCRO811 Microbiology Seminar	1	F2022
MCRO666 Journal Club	1	Sp2023
Mineralogy (Bowdoin)		Sp2008
Investigating Earth (Introductory Geology, Bowdoin)		F2007

Advisement

Graduate students (^current students)

Sean Krepski	M. S. 2011, Ph. D. Geological Sciences; technician in Chan lab 2012-2013 (currently a middle school Earth Science teacher in New York City)
Michelle Owens	M. S. Geological Sciences, 2010-2011
Kevin Cabaniss	M. S. Geological Sciences, 2011-2014 (currently a high school science teacher in Virginia)
Sean McAllister	Ph. D. 2019. Marine Biosciences, 2012-2019 (Delaware Space Grant graduate fellow 2012-2013, 2016-2017, UD Dissertation fellow 2017-2018; now a research scientist at NOAA/University of Washington)
Shane Cone	M. S. Geological Sciences, 2013-2014 (currently an Environmental Scientist, Delaware Department of Natural Resources and Env. Control)
Beverly Chiu	M. S. 2017, Geological Sciences, 2015-2017 (currently Senior research associate, C16 Biosciences)
Gretchen Dykes	Ph. D. 2021. Microbiology, 2015-2021 (Townsend Fellow, 2019-2020, UD Dissertation Fellow, 2020-2021; currently a Biologist at EPA)
Michael Pavia	M. S. 2018, Biological Sciences, 2016-2018 (currently a Ph.D. student at Arizona State University)
Arkadiy Garber	M. S. 2018, Geological Sciences, 2016-2018 (currently a Ph.D. student at Arizona State University)
Nanqing Zhou	Ph. D. 2022 Marine Biosciences, 2017-2022 (Joanne Daiber Fellow, 2020-2021; UD Dissertation fellow 2021-2022; currently postdoc at Northwestern Univ.)
Rebecca Vandzura	M. S. 2019, Marine Biosciences, 2017-2019 (AGU Outstanding Presentation award 2019; currently a high school science teacher, Toms River School District, NJ)
Jordan Knuth	Ph. D. Microbiology, 2018-2020
Rene Hoover^	Ph. D. Microbiology, 2019-present. (UD Graduate Fellow 2022-2024)
Louis Del Cueto	M. S. Geological Sciences, 2020-2021
Grace Tothoro^	Ph. D. Microbiology, 2020-present
Olushola Awoyemi^	Ph. D. Microbiology, 2021-present

Rotation students: Andrew Hydrusko, Fall 2010; Ronald McMillan, Summer 2018; Vadesse Noundou, Spring 2019 (Biological Sciences); Grace Tothero, Fall 2020; Casey Derieux Fall 2022 (Microbiology)

Postdoctoral researchers (^current postdocs and staff)

Gaurav Saini	June 2010-Aug. 2011 (currently Associate Professor, Sharda University, Uttar Pradesh, India)
Chaofeng Lin	Feb. 2012-Jan. 2013 (currently science writer/editor, Translation Studio eChoice, and environmental consultant, Qingdao Transcend Environtech, Shandong, China)
Cassandra Marnocha	January 2014-July 2016 (currently Associate Professor, Niagara University)
Shingo Kato	April 2014-Aug 2015 (currently Senior Scientist, RIKEN Japan Collection of Microorganisms)
Erin Field	May 2014-Nov 2015 (currently Associate Professor, East Carolina University)
Pauline Henri	October 2015-September 2017 (Lecturer in France)
Jessica Keffer^	October 2017-2022, now Associate Scientist in Chan group
Sean McAllister	September-November 2019 (currently a research scientist at NOAA/University of Washington)
Danielle Rushworth^	February 2022-present

Undergraduate researchers (*Senior thesis)

(students in Biological Sciences, Chemistry, Environmental Sciences, and Geological Sciences)

Jeff Brodzinski	Spring 2009 (also a technician in Chan lab 2011-2012)
Emily Olson	Spring 2009-Spring 2010, DE Water Resource Center intern
Natalie Villa	Winter-Spring 2010
Santiago Suarez	Spring-Fall 2010, NSF EPSCoR summer scholar (\$3500 stipend+\$500 research funds)
Allison Gutsche	Summer 2010, UD summer undergraduate fellow (\$500 stipend)
Rachel Ibers	Winter-Spring 2012
Rebecca Gripp	Summer 2012-Spring 2013, NSF EPSCoR summer scholar (\$4000 stipend+\$500 research funds)
Joshua Barnett*	Winter 2013- Spring 2015, NSF EPSCoR summer scholar (\$4000 stipend+\$500 research funds), DENIN scholar (\$5500 stipend)
Kara Hoppes	November 2014-June 2016, NSF EPSCoR summer scholar (\$4000 stipend), DENIN scholar (\$6000 stipend)
Andrew Currie	September 2016-May 2017, DENIN scholar (\$3000 stipend)
Michelle Hallenbeck*	January 2017-May 2019, NASA Delaware Space Grant Summer Intern (\$4000 stipend), DENIN Environmental Scholar (\$3000 stipend), NSF EPSCoR summer scholar (\$4000 stipend), Sigma Xi

Annie Browne Spring 2019

Austin Chambers Summer 2023, INBRE Summer Scholar

Christopher Blanda[^] June 2023-present

High school researcher

Nicholas Gardner Summer 2010

Academic adviser to 8 undergraduates, 3 Microbiology 1st year PhD students

Visitors

Shingo Kato Visiting postdoc from Japan Collection of Microorganisms,
RIKEN BioResource Center, January-February 2013

Hakon Dahle Visiting postdoc from University of Bergen, February 2014

Jan van der Roost Visiting student from University of Bergen, February 2014

Brandi Kamermans Visiting postdoc from Penn State, July 2017
Cron

Rebecca Cooper Visiting postdoc from Friedrich Schiller U. Jena, October 2018

Graduate committees

Maria Wilburn, M. S. 2011, Oceanography

Kiran Upreti, M. S., 2013, Plant and Soil Sciences

Laurel Kegel, Ph. D. 2013, Chemistry

Patricia Hrezdak-Showalter, Ph. D. Oceanography

Autumn Starcher, Ph. D. 2016, Plant and Soil Sciences

Mengyin Yao, Ph. D. 2016, Civil and Environmental Engineering

Jacob Hilzinger, Ph. D. 2017, Marine Biosciences

Katie Kalis, Ph. D. 2019, Marine Biosciences

LeAundra Jeffs, M. S. 2019, Marine Biosciences

Gretchen Dykes, Ph. D. 2021, Microbiology

Tian Bai, Ph. D. Civil and Environmental Engineering

Austin Grant, Ph. D. Microbiology

Leonard Ohenhen, M. S. 2021, Geological Sciences

Robert Kupper, Ph. D. 2022, Earth and Planetary Sciences, Washington University, St. Louis

Emily Davenport, Ph. D., Plant and Microbial Biosciences, Washington University, St. Louis

Stefanie Becker, Ph. D. Geosciences, Univ. Tübingen

Vadesse Noundou, Ph. D. Biological Sciences (qualifying exam chair)

Alicia Kreiman, Ph. D. Biological Sciences

Nikita Varde, Ph. D. Biological Sciences

Senior thesis committee

Joshua Barnett, B. S. Biological Sciences, 2015

Nicole Coffey, B. S. Marine Science/Chemistry, 2018

Michelle Hallenbeck, B. S. Biological Sciences, 2019

Service

Professional service (^current positions, *significant leadership position)

Journal editorial position

[^]Editorial Board, ISME Communications, 2021-present

^Associate editor, *Frontiers in Microbiological Chemistry and Geomicrobiology* (*Frontiers in Microbiology, Environmental Science, and Earth Science*), 2017-present

Review editor, *Frontiers in Microbiological Chemistry and Geomicrobiology*, 2011-2017

^Review editor, *Frontiers in Extreme Microbiology* (*Frontiers in Microbiology*), 2011-present

^Editorial Board, *Geobiology*, 2013-present

Journal article reviews

Geochimica et Cosmochimica Acta, *Environmental Science and Technology*, *Science*, *Geomicrobiology*, *Geology*, *Geobiology*, *Chemical Geology*, *Geochemical Transactions*, *American Mineralogist*, *Environmental Microbiology*, *Applied and Environmental Microbiology*, *Elements*, *PNAS*, *Scientific Reports*, *Nature Geoscience*, *Frontiers in Microbiology*, *ISME Journal*, *mSphere*, *FEMS*, *ACS Nano*

Proposal reviews

National Science Foundation (NSF) Biological Oceanography, NSF Geobiology and Low Temperature Geochemistry (3 panels), NSF Integrative Organismal Systems (1 panel), NSF MRI, NASA, Minnesota Environment and Natural Resources Trust, C-DEBI (NSF Center for Dark Energy Biosphere Investigations), NSERC (Natural Sciences and Engineering Research Council of Canada), Schmidt Ocean Institute

Conference and session organization

*^ Geobiology Gordon Research Conference co-Chair for 2024 meeting (January 14-19, Galveston TX)

Geobiology Gordon Research Conference co-Vice Chair for 2022 meeting

American Geophysical Union Fall Meeting 2023 “Critical Elements: From Natural Cycles to a Sustainable Future”

American Chemical Society Spring Meeting 2018, 2022, 2024 “Microbially-Driven Geochemical Reactions: Kinetics and Communities”

Mid-Atlantic Geobiology Symposium, University of Delaware, Feb 24, 2023, co-organizer

Goldschmidt Meeting 2022, “Microbe-mineral interactions: from molecular mechanisms to environmental impacts”

Goldschmidt Meeting 2020, Theme Chair for “Mineral, Melt, and Fluid Chemistry”

Goldschmidt Meeting 2015, “The evolution of biomineralization: Using the modern to infer the past”

Geological Society of America Meeting 2015, “Geomicrobiology: Microbes as a geologic force on modern and ancient Earth”

American Geophysical Union Fall Meeting 2011, "Microbe-mineral interactions in modern and ancient environments"

American Geophysical Union Fall Meeting 2007, “Geomicrobiology and Biogeochemistry of Iron and Manganese”

Workshop participant

NSF workshop on Geomicrobiology and Microbial Geochemistry, 2013

University, College (CEOE), and Department service at Delaware (^current positions)

Committees/leadership

CEOE Academic Council, 2021-2023

CEOE Diversity/IDEA Committee, 2017-2023

*Dept. of Earth Sciences Strategic Planning lead, 2020-2021

University Graduate College Interdisciplinary Curriculum Committee, 2020-2022

University Graduate College Council, 2019-2022

^Microbiology Graduate Program:

*^Program Director, 2021-present (on leave during sabbatical)

^Steering/Executive Committee, 2018-present

Graduate admissions coordinator, 2021

Microbiology Symposium organizer, 2021 and 2023

CEOE Awards Committee, 2018-2020

Earth Sciences Promotion and Tenure committee, 2021-2023

Geological Sciences Business Administrator search committee, 2018

*Graduate Program Director, Dept. of Geological Sciences/Earth Sciences, 2016-2019

Strategic Planning Initiative, Models for the New American Research University working group, 2014-2015

Faculty search committee, department chair, Dept. of Geological Sciences, 2013-2014

*Chair, Safety committee, Dept. of Geological Sciences, 2012-2014

Faculty search committee, Geochemist, Dept. of Geological Sciences, 2012

*Chair, Undergraduate curriculum committee during curriculum revision, Dept. of Geological Sciences; successfully applied for and hosted SERC Building Strong Geoscience Departments visiting workshop, 2010-2011

Graduate Committee, Dept. of Geological Sciences/Earth Sciences, 2011-2012, 2016-2019

Faculty search committees, Environmental Cluster hire, College of Earth, Ocean, and Environment, 2011 and 2012

Faculty search committee, Critical Zone Scientist, Dept. of Plant and Soil Sciences, 2010

Organizer, Dept. of Geological Sciences seminar, Fall 2009, Spring 2012, Spring 2015, Fall 2020, Spring 2021

Other activities

Founder/organizer, Geological Sciences poster symposium, 2012-2013, 2015, 2017

Panelist, DENIN Scholar's winter retreat career panel, 2017

Co-organizer, Delaware Biotechnology Institute research symposium, 2011

Delaware Decision Days presenter, 2010

New Student Orientation advising, 2010

Co-led DE EPSCoR Grants workshop, reported results at annual DE EPSCoR meeting, June 10-11, 2009

Biogeochemistry and Microbiology interdisciplinary graduate programs planning

Interdisciplinary Science and Engineering Building core facilities planning and equipment purchasing

Outreach at Delaware

Workshops at Serviam Academy to introduce 5th-8th grade girls to geo/environmental microbiology using a combination of soil sampling, culturing, and microscopy activities, Summer camps 2014-2016, 2020, 2022, Fall semester 2019 weekly workshops

College of Earth, Ocean, and Environment's annual Coast Day, ongoing annually

Careers in Academia panelist, DENIN scholars retreat 2017

Science Café (informal presentation and Q&A open to public): "Ancient life: finding your microbial ancestors on Earth and beyond," UD Center for Science Ethics and Public Policy, Nov. 22, 2011

EPSCoR INBRE summer student scholars environmental careers panel 2010

Environmental Technology Week Teacher workshop (presentation and lab demo) and Charter School of Wilmington AP Environmental Science class 2010

UD Mineral Museum presentation to DE Natural History Society 2010