

## ***Chiachi Hwang, Ph.D.***

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### **CURRENT POSITION (2012-)**

Industrial Research Scientist

Center for Biofilm Engineering, Montana State University

### **EDUCATION**

Postdoctoral Research Fellow, University of Illinois at Urbana-Champaign	2009-2012
Ph.D. Microbiology, Miami University	2009
B.A. Biology, Ohio Wesleyan University	2003

### **PROFESSIONAL EXPERIENCE**

I am working at Center for Biofilm Engineering at Montana State University as an industrial research scientist. I have used different sequencing methodologies, from Sanger sequencing, 454 pyrosequencing, to the current Illumina next-generation sequencing to characterize microbial communities (*e.g.*, bacteria, archaea, and fungi) from various natural and industrial environments. I also have experience in using different reactor systems (*e.g.*, CDC, drip flow, and column reactors) that mimic industrial systems in order to study microbial interactions and response under different industrial conditions and treatment processes. Currently, in collaboration with another MSU research group, I am involved with COVID-19 testing and sequencing for SARS-CoV-2 variants.

### **RESEARCH TOPICS**

1. Industrial system processes
  - a. *Microbial community analysis*: characterize changes in microbial community under different system processes or treatments. The majority of these include testing projects for CBE industrial associates.
  - b. *Product contamination*: identify microorganisms in different stages of production in order to identify potential contaminant source.
  - c. *Microbially induced corrosion*: biofilm physiology characterization and gene expression analysis of biofilm grown on carbon steel, stainless steel, and copper surfaces in relation to nutrient availability in CDC reactors.
2. Environmental technologies
  - a. *Microbes and mining issues*: examine changes in microbial community in relation to bio-reduction of metals (*e.g.*, selenium) in waste rock column reactors in order to evaluate and implement conditions conducive to microbially mediated heavy metal containment strategies at mine sites.
  - b. *Microbes-metal interaction*: characterize microbial populations in relation to depth and metal geochemistry in a spent mine ore heap leach.
  - c. *Microbes in heavy-metal contaminated river sediments*: characterize microbial communities in mercury impacted freshwater sediments.
3. Health/medical biofilms
  - a. *Chronic wound microbial characterization*: analysis of microbial communities from different wound dressing.
  - b. *Chronic wound healing/microbe-microbe interactions*: cultivation of multi-species biofilm in order to understand pathogen metabolism and interactions in chronic wounds
  - c. *Oral health and anti-microbial efficacy*: use of drip-flow reactor to evaluate efficacy of oral biofilm reduction and gene expression in response to toothpaste formula

## JOURNAL PUBLICATIONS

1. SLAMP: A Rapid Fluorometric RT-LAMP Assay for Sensitive and Specific Detection of SARS-CoV-2 from Human Saliva, D.A. Bikos, C. Hwang, K.A. Brileya, A. Parker, E.K. Loveday, M. Rodriguez, T. LeFevre, I. Thornton, J.N. Wilking, M. Dills, S.T. Walk, A.K. Adams, R. Plowright, A.B. Hoegh, J.R. Carter, J. Morrow, M. Taylor, D. Keil, M.W. Fields, **C.B. Chang**, medRxiv 2021.03.31.21254634, 2020. [Preprint]. April 5, 2021. Available from: <https://medrxiv.org/cgi/content/short/2021.03.31.21254634v1>.
2. **Hwang C**, Copeland A, Lucas S, Lapidus A, Barry K, Detter JC, Glavina Del Rio T, Hammon N, Israni S, Dalin E, Tice H, Pitluck S, Chertkov O, Brettin T, Bruce D, Han C, Schmutz J, Larimer F, Land ML, Hauser L, Kyrpides N, Mikhailova N, Ye Q, Zhou J, **Richardson P**, Fields MW. 2016. Complete genome sequence of *Alkaliphilus metalliredigens* Strain QYMF, an alkaliphilic and metal-reducing bacterium isolated from borax-contaminated Leachate Ponds. *Genome Announcement*. 4(6).
3. Phillips AJ, Cunningham AB, Gerlach R, Hiebert R, **Hwang C**, Lomans BP, Westrich J, Mantilla C, Kirksey J, Esposito R, Spangler L. 2016. Fracture sealing with microbially-induced calcium carbonate precipitation: a field study. *Environmental Science & Technology*. 50:4111-4117.
4. **Hwang C**, Copeland A, Lucas S, Lapidus A, Barry K, Glavina Del Rio T, Dalin E, Tice H, Pitluck S, Sims D, Brettin T, Bruce DC, Detter JC, Han CS, Schmutz J, Larimer FW, Land ML, Hauser LJ, Kyrpides N, Lykidis A, Richardson P, Belieav A, Sanford RA, Löeffler FE, Fields MW. 2015. Complete genome sequence of *Anaeromyxobacter* sp. Fw109-5, an anaerobic, metal-reducing bacterium isolated from a contaminated subsurface environment. *Genome Announcement*. 3(1).
5. Ramsay BD, **Hwang C**, Woo HL, Carroll SL, Lucas S, Han J, Lapidus AL, Cheng JF, Goodwin LA, Pitluck S, Peters L, Chertkov O, Held B, Detter JC, Han CS, Tapia R, Land ML, Hauser LJ, Kyrpides NC, Ivanova NN, Mikhailova N, Pagani I, Woyke T, Arkin AP, Dehal P, Chivian D, Criddle CS, Wu W, Chakraborty R, Hazen TC, Fields MW. 2015. High-quality draft genome sequence of *Desulfovibrio carbinoliphilus* FW101-2B, an organic acid-oxidizing sulfate reducing bacterium isolated from uranium (VI)-contaminated groundwater. *Genome Announcement*. 3(2).
6. Ling F, **Hwang C**, LeChevallier MW, Andersen GL, Liu WT. 2016. Core-satellite populations and seasonality of water meter biofilms in a metropolitan drinking water distribution system. *International Society for Microbial Ecology Journal (ISME J)*. 10:582-595.
7. Lautenschlager K, **Hwang C**, Liu WT, Boon N, Köster N, Vrouwenvelder H, Egli T, Hammes F. 2014. Abundance, composition and function of indigenous bacterial communities in a full-scale drinking water treatment plant. *Water Research*. 62:40-52.
8. Lautenschlager K, **Hwang C**, Liu WT, Boon N, Köster N, Vrouwenvelder H, Egli T, Hammes F. 2013. A microbiology-based multi-parametric approach towards assessing biological stability in drinking water distribution networks. *Water Research*. 47:3015-3025.
9. **Hwang C**, Ling F, Andersen GL, LeChevallier MW, Liu WT. 2012. Microbial community dynamics of an urban drinking water distribution system subjected to phases of chloramination and chlorination treatments. *Applied Environmental Microbiology*. 78:7856-7865.
10. **Hwang C**, Ling F, Andersen GL, LeChevallier MW, Liu WT. 2012. Evaluation of methods for the extraction of DNA from drinking water distribution system biofilms. *Microbes and Environment*. 27:9-18.
11. Tamaki H, Wright CL, Li X, Lin Q, **Hwang C**, Wang S, Thimmapuram J, Kamagata Y, Liu W-T. 2011. Analysis of 16S rRNA amplicon sequencing options on the Roche/454 next-generation titanium sequencing platform. *PLoS ONE* 6: e25263. doi:10.1371/journal.pone.0025263.

12. Wu W-M, Carley J, Watson D, Gu B, Brooks S, Kelly SS, Kemner K, van Nostrand JD, Wu L, Xu M, Zhou J, Luo J, Cardenas E, **Hwang C**, Fields MW, Marsh TL, Tiedje JM, Green SJ, Kostka JE, Kitanidis PK, Jardine PM, Criddle CS. 2011. Bioreduction and immobilization of uranium in situ: a case study at a USA Department of Energy radioactive waste site, Oak Ridge, Tennessee, *Acta Scientiae Circumstantiae (Chinese)*. 31:449-459.
13. Hong PY, **Hwang C**, Ling F, Andersen GL, LeChevallier MW, Liu WT. 2010. Pyrosequencing analysis of bacterial biofilm communities in water meters of a drinking water distribution system. *Applied and Environmental Microbiology*. 76:5631-5635.
14. **Hwang C**, Wu W, Gentry TJ, Carley J, Corbin GA, Carroll SL, Watson DB, Jardine PM, Zhou J, Criddle CS, Fields MW. 2008. Bacterial community succession during *in situ* uranium bioremediation: spatial similarities along controlled flow paths. *International Society for Microbial Ecology Journal (ISME J)*. 3:47-64.
15. Wu WM, Carley J, Luo J, Ginder-Vogel MA, Cardenas E, Leigh MB, **Hwang C**, Kelly SD, Ruan C, Wu L, Van Nostrand J, Gentry T, Lowe K, Mehlhorn T, Carroll S, Luo W, Fields MW, Gu B, Watson D, Kemner KM, Marsh T, Tiedje J, Zhou J, Fendorf S, Kitanidis PK, Jardine PM, Criddle CS. 2007. *In situ* bioreduction of uranium (VI) to submicromolar levels and reoxidation by dissolved oxygen. *Environmental Science & Technology*. 4:5716-5723.
16. **Hwang C**, Wu WM, Gentry TJ, Carley J, Carroll SL, Schadt C, Watson D, Jardine PM, Zhou J, Hickey RF, Criddle CS, Fields MW. 2006. Changes in bacterial community structure correlate with initial operating conditions of a field-scale denitrifying fluidized bed reactor. *Applied Microbiology Biotechnology*. 71:748-760.

#### RESENT PRESENTATIONS

1. Center for Biofilm Engineering Seminar Series. Bozeman, Montana, September 2016. "Evaluation of selenium reduction in saturated rock backfills. **Hwang C**, Kirk L, and Peyton B.
2. 7<sup>th</sup> *International Symposium on Biohydrometallurgy*, Falmouth, United Kingdom, June 2014. "Bacterial community changes with depth and metal geochemistry in spent ore gold heap leach." **Hwang C**, Kirk L, Fields MW.
3. *Society for Microbiology & Biotechnology, Annual Meeting & Exhibition*, San Diego, August 2013. "Application of microbial ecology for industrial purposes." **Hwang C** and Fields MW.
4. *Water Quality Technology Conference and Exposition (WQTC)*, Phoenix, Arizona, November 2011. "Microbial community composition and dynamics in a non-chlorinated drinking water treatment and distribution system." **Hwang C**, Lautenschlager K, Köster O, Vrouwenvelder H, Hammes F, Liu WT.
5. *Water Quality Technology Conference and Exposition (WQTC)*, Savannah, Georgia, November 2010. "Comparison of different nucleic acids extraction methods for the molecular analysis of drinking water biofilms." **Hwang C**, Ling F, Andersen GL, LeChevallier M, Liu WT.

#### SELECTED SERVICES AND AWARDS

Montana State University, Center for Biofilm Engineering, Seminar Presentation Committee	2012-
Environmental Remediation Sciences Program PI Workshop Travel Award, Department of Energy, Lansdowne, VA	2007, 2006
Center for Bioinformatics and Functional Genomics Summer Research Scholarship, Miami University	2006
Susan W. Rockwood Teaching Excellence Award, Department of Microbiology, Miami University	2006
Corporate Activities Program Student Travel Grant Student Travel Award, American Society for Microbiology, 106 <sup>th</sup> General Meeting, Orlando, FL, ASM	2006

## **TEACHING EXPERIENCE**

Lectures: Applied Environmental Microbiology; Microorganisms and Human Disease

Laboratory: Medical Bacteriology; Microbial Physiology; General Microbiology I and II.

Workshop: Montana Biofilm Science & Technology Meeting: “Microbial Ecology Methods/Bioinformatics and Data Interpretation.”

## **EDITOR AND REVIEWER EXPERIENCE**

*Annals of Microbiology; International Biodeterioration and Biodegradation; Ecotoxicology; Frontiers in Microbiology*

## **MEMBERSHIP AND PROFESSIONAL ORGANIZATIONS**

1. Membership in 500 Women Scientists (Bozeman Pod)
2. Sigma Xi, the Scientific Research Society, Associate Member, Miami University-Ohio Chapter
3. Membership in American Science for Microbiology
4. Membership in International Society for Microbial Ecology
5. Membership Association for Women in Science