

Andrew R. Sabalowsky

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Education

Ph.D., Civil Engineering (Environmental Eng. Concentration). (January 2009)

Oregon State University, Corvallis, OR

M.S. Environmental Engineering (May 1999)

Virginia Polytechnic Institute and State University, Blacksburg, VA

B.S. Aerospace Engineering, Minor Philosophy, Magna Cum Laude (May 1994)

Virginia Polytechnic Institute and State University, Blacksburg, VA

Academic Appointments

Instructor, Department of Mechanical Engineering (2016-present): University of South Carolina, Columbia, SC

Assistant Professor (2012-2016): Benedict College, Columbia, SC

Postdoctoral Research Associate (2009-2012): Center for Biofilm Engineering, Montana State University

Research Activities

Faculty Research (2013 to 2016): Benedict College

- Researching and advising students under DOE Environmental Management (Grant #0000217392) on anaerobic TCE biodegradation with unique *Dehalococcoides*-containing cultures capable of functioning at very low pH conditions
- Researching and advising students under NSF HBCU-RIA (#HRD14-00991) on methanogenesis from municipal waste with tetracycline removal.
- Researching and advising undergraduate students in affiliation with the Summer undergraduate Research Internship (SURI) program for Summer 2013 and Summer 2014. Research was focused on operating microbial systems comparing different cultures, electron donors, and operating temperatures to achieve methanogenesis
- Researching and advising undergraduate students in affiliation with the DOE HBCU-EM grant (#000473). Research is a continuation of summer 2013 activities, focused on method development on HPLC for tetracycline quantification, as well as operating wastewater treatment sludge cultures for methanogenesis, with the ultimate objective of using the process for tetracycline reduction or destruction.

Post-Doctoral Research (2009 to 2012): MSU Center for Biofilm Engineering

- Investigating electron transport within cells, between cells, and to extracellular matrices (solid surfaces, dissolved metals, and aqueous sulfate) in the ubiquitous sulfate reducing bacterium, *Desulfovibrio vulgaris* Hildenborough (DvH).
- Operating CDC Biofilm reactors with DvH wild-type pure cultures and select gene deletion mutants to learn:
 - which genes and extra-cellular features (pili and flagella) are important to electron transport and biofilm formation for DvH; and
 - how differing electron donor/acceptor sources and ratios impact biofilm formation and electron transport.
- Building and operating microbial fuel cells, using DvH as a biological anode to study electron transport and the role of biofilm and extracellular features in electron transport.
- Using Field Emission Scanning Electron Microscopy (FE-SEM) to visualize extracellular features in biofilms.
- Operating batch growth experiments to determine how aqueous chromium(VI) affects cell growth rate, viability, and the role of pili or flagella in chromium(VI) reduction.

Ph.D. Research (2002 to 2008):

- Operated microcosms, batch culture experiments, constructed and operated chemostats and recirculating packed columns to study reductive dechlorination of chloroethenes in mixed anaerobic *Dehalococcoides*-containing cultures.
- Used above systems combined with anaerobic culturing techniques, gas chromatography (GC), high pressure liquid chromatography (HPLC), ion chromatography (IC), and quantitative polymerase chain reactions (qPCR) to investigate issues such as: Haldane inhibition of chloroethenes on their own dechlorination; toxicity of high concentrations of trichloroethene (TCE) and cis-1,2-dichloroethene (cDCE) to the dechlorination process; community shifts over time in long-term chemostat operation; gene expression under various conditions; and the comparison of attached to suspended growth for anaerobic reductive dechlorination of TCE.
- Modeled dechlorination activity as Michaelis-Menten-based kinetics with inhibition, growth, decay and toxicity parameters for both batch and flow-through systems to describe observed activity
- Researched the use of alkynes as tools for probing mechanisms of reductive dechlorination of chloroethenes in association with the Western Region Hazardous Substance Research Center (WRHSRC), Project 1-OSU-01
- Supplied culture, technical expertise, and endpoint microcosm operation in bioaugmenting continuous flow column studies for reductive dehalogenation in association with WRHSRC, Project 2-OSU-07

M.S. Research (Summer 1998):

- Constructed and operated four different bench-scale treatment systems to investigate best strategy for treating a complex industrial wastewater with high ammonia loading and seasonal high temperatures at the Hopewell Regional Wastewater Treatment Facility, Hopewell, VA

Consulting Experience

Environmental Engineering E.I.T. (October 1999 to October 2001)

EGR & Associates, Eugene, OR (Phil Stallings)

- Managed monitoring, sampling, and reporting of active and closed landfills
 - Prepared quarterly and annual groundwater quality assessment reports for various landfills, including reviewing and risk-based analysis of laboratory and field data
- Collected well samples and oversaw groundwater monitoring well installation

Environmental Engineering E.I.T. (February 1998 to October 1999)

Environmental Engineering, Inc., Blacksburg, VA (Chris Swan, President)

- Monitored and maintained equipment for dual-phase and soil vapor extraction systems
- Oversaw monitoring well installation
- Collected groundwater samples and performed slug tests, estimated hydraulic parameters, and designed UST remediation strategies based on data collected.
- Researched and documented feasibility of bioremediation strategies for specific UST sites.

Synergistic Activities

Benedict College Recycling Coordinator (2014-present): Benedict College, Columbia, SC

- Applied for and received community grant to purchase recycle bins.
- Coordinating recycling education and collection activities

MSU Sustainability Advisory Council (2010 to 2012)

- Elected as a Professional Council representative to the Campus Sustainability Advisory Council (CSAC).
 - Drafting portions of the Climate Action Plan (CAP)
 - Managing Editor of CAP: editing and coordinating CAP writing activities
 - Seeking grant funding relevant to sustainable infrastructure and education improvements at MSU using the SMARTS and COS grant search databases
 - Prioritizing and coordinating MSU campus infrastructure improvement projects, and public outreach communications on and off campus
 - Reviewing and advising in the MSU president's task force meetings assessing the current Energy Performance Contracting for feasible sustainability infrastructure improvements.

Engineers Without Borders (2005 to 2008)

- Vice-president and co-founding member of Oregon State University chapter of Engineers Without Borders (OSU-EWB) (April 2005 to August 2006):
Assisted with drafting of chapter constitution, securing membership in EWB national organization, gaining local publicity, and securing university and private funding.
- Water Quality Assessment team leader (February 2006 to October 2006):
Trained EWB members and designed sampling strategy. Supervised and implemented water sampling and analyses in country on second site assessment trip by OSU-EWB to Las Mercedes y El Naranjito, El Salvador (September 2006).
- Active member and water quality assessment consultant (2006 to 2009)

Other Instructing Activities

Microbial Fuel Cell Workshop (2010 to 2012)

- Conducting workshops demonstrating microbial fuel cell construction and operations to visiting corporate sponsors of the Center for Biofilm Engineering at the semi-annual Montana Biofilm Meetings (Feb 2010, Jul 2010, and Feb 2011)

Teaching workshop attendee (November 18, 2009)

- Completed “Educating Engineers: Designing for the Future of the Field,” teaching workshop. Participants learned how to engage students in the classroom by first teaching first principles and “big picture” concepts before supplying specific detail- and calculation-based information, to facilitate critical thinking and deeper understanding of subject material.

Teaching course attendee (January 2008 to March 2008)

- Completed “Success in the College Classroom,” a teaching course for present and future university instructors.
- Learned best practices and strategies for: articulating outcomes and syllabi, effective lecturing, designing effective group and peer learning activities, managing behavioral dilemmas, measuring outcomes, documenting teaching effectiveness, and engaging active students.

Research Mentor for undergraduate students (Summer 2004 and Summer 2005)

- Mentored undergraduate researchers under National Institute of Environmental Health Sciences (NIEHS) Training Grant #1P42 ES10338. Trained in anaerobic microcosm operation for batch kinetic tests, standard curve production, GC analyses, and advised on graduate school and professional career options.

Community Teaching (2004)

- Guest instructor about water quality issues for Cheldelin Middle School (Corvallis, OR) science class (Spring 2004).
- Prepared education unit with activities regarding analytical chemistry and remediation of a hypothetical chromium- and TCE-contaminated site for the Science and Math Investigative Learning Experiences (SMILE) program, which is focused on stimulating interest in scientific careers among children of underrepresented and educationally disadvantaged backgrounds (Spring 2004).

Publications

Refereed Papers

- Sabalowsky, AR and L Semprini. 2010. Trichloroethene and cis-1,2-dichloroethene concentration-dependent toxicity model simulates anaerobic dechlorination at high concentrations: I. batch-fed reactors. *Biotechnology and Bioengineering*, 107(3):529–539.
- Sabalowsky, AR and L Semprini. 2010. Trichloroethene and cis-1,2-dichloroethene concentration-dependent toxicity model simulates anaerobic dechlorination at high concentrations: II. Continuous flow and attached growth reactors. *Biotechnology and Bioengineering*, 107(3):540–549.
- Sabalowsky, AR. 2010. Spotlight: Modeling solvent toxicity with concentration-dependent increased cell decay. *Biotechnology and Bioengineering*, 107(3):fmv

- Behrens, S., MF Azizian, PJ McMurdie, A Sabalowsky, ME Dolan, L Semprini, and AM Spormann. 2008. Monitoring Abundance and Expression of *Dehalococcoides* sp. Chloroethene Reductive Dehalogenases in a PCE-Dechlorinating Continuous Flow Column. *Applied and Environmental Microbiology*, **74**:5695-5703.
- Azizian, MF, S Behrens, A Sabalowsky, ME Dolan, AM Spormann, and L Semprini. 2008. Continuous-flow column study of reductive dehalogenation of PCE upon bioaugmentation with the Evanite enrichment culture. *Journal of Contaminant Hydrology*, **100**:11-21.

Journal articles in preparation:

- Quantification of *Dehalococcoides* 16S rRNA genes correlates directly to cDCE and vinyl chloride dechlorination rates in mixed community chemostats.

Conference Presentations

- Nato, N and AR Sabalowsky. April, 2015. Substrate and Temperature Effects on Methanogenesis in Food Waste Sludge Digestion. *SC ASM Spring Meeting*.
- Sabalowsky, AR. July, 2010. Factors affecting biofilm formation by *Desulfovibrio vulgaris* Hildenborough. *Montana State University Center for Biofilm Engineering: Biofilm Science and Technology Semi-annual Meeting*.
- Sabalowsky, AR. October, 2009. Differences in toxicity observed in suspended and biofilm growth as described by a supermodel. *Montana State University Center for Biofilm Engineering Seminar Series*.
- Sabalowsky, A.R. and L. Semprini. 2007. Comparison of Attached vs. Suspended Growth for Anaerobic Reductive Dechlorination of High TCE Concentrations. *Subsurface Biosphere Initiative and IGERT Annual Workshop*.

Conference Posters

- Nato, N, TE Williams, and AR Sabalowsky, *Temperature and Substrate Effects on Methanogenesis*. Waste to Wealth Symposium. February 2014. Columbia, SC, USA.
- Nato, N, TE Williams, and AR Sabalowsky, *Substrate and Temperature Effects on Methanogenesis by Digester Sludges*. July, 2013. Columbia, SC, USA.
- Sabalowsky, A.R. and L. Semprini. 2008. The Effect of Formate vs. Lactate on Performance and Community Evolution in Dechlorinating Consortia Grown in Chemostats Treating TCE-Saturated Media. *Subsurface Biosphere Initiative and IGERT Workshop, 2008*.
- Sabalowsky, A.R. and L. Semprini. 2006. Toxicity toward anaerobic reductive dechlorination by *Dehalococcoides*-containing mixed cultures due to high chloroethene concentrations. Abstract 43, *Superfund 2006 Annual Meeting*.
- Behrens, S., M. Azizian, J. McMurdie, J., A. Sabalowsky, M. Dolan, L. Semprini, A. L. Spormann. 2006. Monitoring Gene Abundance and Expression of Reductive Dehalogenases Involved in Complete Dechlorination of PCE Under Continuous Flow Conditions. *11th International Symposium on Microbial Ecology*.
- Sabalowsky, A.R. and L. Semprini. 2005. Alkynes as Reversible Inhibitors for Probing Mechanisms of Reductive Dehalogenation of Chloroethenes. Abstract 1, Poster session II. A. *Joint International Symposia for Subsurface Microbiology (ISSM 2005) and Environmental Biogeochemistry (ISEB XVII)*.

Semprini, L., M. Azizian, A. Sabalowsky, M. Dolan, P. Ruiz-Hass, J. Ingle, S. Behrens, A. Spormann. 2005. A Continuous Flow Column Study of Anaerobic PCE Transformation with the Evanite Culture and Hanford Aquifer Solids. Abstract 22, Poster session II. A. *Joint International Symposia for Subsurface Microbiology (ISSM 2005) and Environmental Biogeochemistry (ISEB XVII)*.

Sabalowsky, A.R. and L. Semprini. 2004. Acetylene as a reversible inhibitor for probing mechanisms of reductive dehalogenation of chlorinated ethenes. Abstract PM015, *Fourth SETAC World Congress*.

** First author indicates presenting author.

Recent Awards and Honors

- DOE Environmental Management (\$143,000), Grant #0000217392, 2015-2016
- Palmetto Pride Community Pride Award (\$5000), 2015
- NSF Research Initiation Award (\$200,000), Grant #HRD14-00991, 2014-2016
- DOE Environmental Management (\$83,000) Grant #0000473, 2013-2014

Professional Affiliations

- Sigma Xi, American Chemical Society (ACS), American Association for the Advancement of Science (AAAS), Passed E.I.T. exam 1994