

## Rachel A. Brennan, Ph.D.

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### Primary Research Interests

In situ bioremediation of soil and groundwater contaminants  
Biological, chemical, and physical treatment of acid mine drainage  
Sustainable, multifunctional substrates for the treatment of hazardous waste  
Removal of endocrine disruptors from wastewater using enzymatic biocatalysis  
Molecular microbial ecology within remediation systems

### Education

**Ph.D.** Environmental Engineering in Civil Engineering (2003), University of Illinois at Urbana-Champaign  
Dissertation: "Evaluation of Chitin as an Electron Donor and Nutrient Source for Stimulating the In Situ Bioremediation of Chlorinated Solvents." Advisors: Dr. Charles Werth and Dr. Robert Sanford.

**M.S.** Environmental Engineering in Civil Engineering (1999), University of Illinois at Urbana-Champaign  
Thesis: "The Use of Tenax and Radiolabeled Acetate in a Novel Approach to Measure Chlorinated Solvent Bioremediation Kinetics." Advisor: Dr. Robert Sanford.

**B.S.** Geological Engineering with Honors (1997), New Mexico State University  
Honors thesis: "Air-Stripping: Predicting the Effect of Temperature on Henry's Constant using a QSAR Model, and Analyzing the Energy Requirements of Two Competitive Systems." Advisor: Dr. N. Khandan.

### Professional Experience

**Assistant Professor**, Department of Civil & Environmental Engineering, The Pennsylvania State University, University Park, PA (January 2004 – present)

**Consultant**, U.S. Environmental Protection Agency, Engineering Technical Support Center, 2007 – 2008

**Doctoral Research Fellow**, Department of Civil & Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL (August 1999 – December 2003)

**International Research Fellow**, Technical University of Stuttgart, Germany (May 2000 – July 2000)

**Graduate Teaching Assistant**, Biological Principles of Environmental Engineering Lab, University of Illinois at Urbana-Champaign, Urbana, IL (Spring 1999, Spring 2000)

**Graduate Research Assistant**, Department of Civil & Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL (June 1997 – August 1999)

**Summer Intern**, Sandia National Laboratories, Albuquerque, NM (May 1995 – August 1995)

**Research Assistant**, Department of Civil, Agricultural, & Geological Engineering, New Mexico State University, Las Cruces, NM (March 1994 – May 1997)

**Research Assistant**, Biology Department, New Mexico State University, Las Cruces, NM (December 1992 – March 1994)

### Honors and Awards

Outstanding Professor Award, Alpha Chi Sigma Professional Chemistry Fraternity (2007)

**Faculty Early Career Development (CAREER) Award, National Science Foundation** (2007–2012)

**Environmental Protection Agency STAR Fellowship** (2001-2003)

Air & Waste Management Association Scholarship (2001-2002)

Mavis Memorial Fund Scholarship; W. C. Ackermann Scholarship (2001-2002)

Best Technical Presentation, Civil and Environmental Engineering Symposium, UIUC (2001)

NSF Engineering Education Scholars Workshop, Carnegie Mellon University, (2000)

**National Science Foundation Graduate Research Fellowship** (1998-2001)  
National Science Foundation Summer Research Program Award, UNM (1997)  
Top Graduate of Civil, Agricultural, & Geological Engineering Department, NMSU (1997)  
ASCE Daniel Mead Writing Award for paper on Sustainable Development (1996-1997)  
Southwestern Bell Scholarship; Greer Scholarship; Stuart Roberson Scholarship (1996-1997)  
National Winner of American Consulting Engineers Council Scholarship (1995-1996)  
New Mexico Scholar's Scholarship; Crimson Scholar (1992-1996)

## **Funded Proposals**

- **An Emerging Technology for Emerging Contaminants: Biocatalysis of Endocrine Disrupting Chemicals in Wastewater for Beneficial Reuse**, Pennsylvania Water Resources Research Institute (USGS), PI, \$52,500 (March 2009 – February 2010).
- **Passive Remediation of Acid Precipitation in the South Branch of Kinzua Creek Using Crab-Shell Chitin: A Treatability Study**, Pennsylvania Fish and Boat Commission, Co-PI, \$15,729 (January 2009 – May 2009).
- **CAREER: Solving a Global Water Crisis in a Local Watershed: A Comprehensive Analysis of Chitin as a Multifunctional Substrate for the Treatment of Acid Mine Drainage**, National Science Foundation (CBET-0644983), PI, \$413,500 (February 2007 – January 2012).
- **Sustainable Treatment of Diesel Contaminated Sediments Using Spent Mushroom Compost**, The California Mushroom Farm, Inc., PI, \$8,500 (January 2008 – June 2008).
- **In Situ Bioremediation of Perchlorate in Vadose Zone Soil Using Gaseous Electron Donors**, Department of Defense (ESTCP), Co-PI, \$750,148 (September 2005 – December 2007).
- **Passive Remediation of Acid Mine Drainage Using Chitin**, Pennsylvania Water Resources Research Institute (USGS), PI, \$54,000 (March 2006 – February 2007).
- **SBIR Phase II: Bioremediation of Chlorinated Solvents in Saturated, Low Permeability Soils**, National Science Foundation, Co-PI, \$499,996 (February 2004 – December 2004).

## **Publications**

### **Peer Reviewed Journal Publications:**

1. \*Cai, H.,\*Eramo, A. G., Evans, P. J., Fricke, R., and Brennan, R. A. (2009) "In situ bioremediation of perchlorate in vadose zone soil using gaseous electron donors: microcosm treatability study." *Water Environment Research*, in press.
2. \*Robinson-Lora, M. A., and Brennan, R. A. (2009) "Efficient metal removal and neutralization of acid mine drainage by crab-shell chitin under batch and continuous-flow conditions." *Bioresource Technology*, in press.
3. \*Robinson-Lora, M. A., and Brennan, R. A. (2009) "The use of crab-shell chitin for biological denitrification: batch and column tests." *Bioresource Technology*, 100(2): 534 - 541.
4. ‡Daubert, L. N., and Brennan, R. A. (2007) "Passive remediation of acid mine drainage using crab shell chitin." *Environmental Engineering Science*, 24 (10): 1475 - 1480.
5. Rezaei, F., Richard, T. L., Brennan, R. A., and Logan, B. E. (2007) "Substrate-enhanced microbial fuel cells for improved remote power generation from sediment-based systems." *Environmental Science & Technology*, 41 (11): 4053-4058.
6. Brennan, R. A., Sanford, R. A., and C. J. Werth. (2006) "Biodegradation of tetrachloroethene by chitin fermentation products in a continuous flow column system." *Journal of Environmental Engineering*, 132 (6): 664 – 673.

7. Brennan, R. A., Sanford, R. A., and C. J. Werth. (2006b) "Chitin and corncobs as electron donor sources for the reductive dechlorination of tetrachloroethene." *Water Research*, 40: 2125 – 2134.

*Prior to Penn State:*

8. Brennan, R. A., and R. A. Sanford. (2002) "A continuous steady-state method for delivering tetrachloroethene (PCE) to chlororespiring bacteria using Tenax." *Applied and Environmental Microbiology*, 68 (3): 1464-1467.
9. Edwards, F. G., Egemen, E., Brennan, R., and N. Nirmalakhandan. (1999) "Ranking of toxics release inventory chemicals using a level III fugacity model and toxicity." *Water Science & Technology*, 39 (10): 83 – 90.
10. Egemen, E., Corpening, J., Padilla, J., Brennan, R., and N. Nirmalakhandan. (1999) "Evaluation of ozonation and cryptic growth for biosolids management in wastewater treatment." *Water Science & Technology*, 39 (10): 155-158.
11. Brennan, R. A., Nirmalakhandan, N., and R. E. Speece. (1998) "Comparison of predictive methods for Henry's law coefficients of organic chemicals." *Water Research*, 32 (6): 1901-1911.
12. Nirmalakhandan, N., Brennan, R. A., and R. E. Speece. (1997) "Predicting Henry's constant and the effect of temperature on Henry's constant." *Water Research*, 31 (6): 1471 – 1481.
13. Nirmalakhandan, N., Xu, S., Trevizo, C., Brennan, R. (1997) "Additivity in microbial toxicity of non-uniform mixtures of organic chemicals." *Exotoxicology & Environmental Safety*, 37 (1): 97-102.

**Refereed Conference Proceedings:**

1. \*Robinson-Lora, M.A., and Brennan, R. A. (2009) "Rapid alkalinity generation and metal removal from mine impacted water using crab-shell chitin under abiotic conditions." *Oral paper presentation*, National Meeting of the American Society of Mining and Reclamation, Billings, MT, June 2.
2. Venot, C., Figueroa, L., Brennan, R. A., Wildeman, T.R., Reisman, D., Sieczkowski, M. (2008) "Comparing chitin and organic substrates on the National Tunnel waters in Blackhawk, Colorado, for manganese removal." *Oral paper presentation*, National Meeting of the American Society of Mining and Reclamation, Richmond, VA, June 17.
3. †Korte, K. M., \*Newcombe, C. E., and Brennan, R. A. (2008) "Evaluation of three different purities of crab-shell for the remediation of mine impacted water." *Oral paper presentation*, National Meeting of the American Society of Mining and Reclamation, Richmond, VA, June 17.
4. \*Robinson-Lora, M.A., and Brennan, R. A. (2008) "Evaluating crab-shell chitin, lactate, and spent mushroom compost for acid mine drainage remediation in central Pennsylvania." *Oral paper presentation*, National Meeting of the American Society of Mining and Reclamation, Richmond, VA, June 17.
5. Martin, J.P., Sorenson, K.S. Jr., Brennan, R.A., Sanford, R.A., Werth, C.J., Bures, G.H., Guest, G., and Fulton, R. (2004) "Full-scale application of chitin for bioremediation of chlorinated solvents." *Remediation of Chlorinated and Recalcitrant Compounds: The Fourth International Conference.*

*Prior to Penn State:*

6. Brennan, R.A., Werth, C.J., Sanford, R.A., Sorenson, K.S., Martin, J.P., and Bures, G.H. (2002) "From the lab to the field: development and deployment of the halo-respiration enhancing redox

transition zone (HERTZ) technology for bioremediation." Association of Environmental Engineering & Science Professors Conference, Canada.

7. Martin, J.P., Sorenson, K.S., Peterson, L.N., Brennan, R.A., Werth, C.J., Sanford, R.A., Bures, G.H., and Taylor, C.J. (2002) "Enhanced CAH dechlorination in a low permeability, variably-saturated medium." Proceedings of the Remediation of Chlorinated and Recalcitrant Compounds: The Third International Conference.
8. Vera S.M., Brennan, R.A., Werth, C.J., and Sanford, R.A. (2000) "Analysis of substrates to support a halorespiration enhanced redox transition zone, HERTZ, in chlorinated solvent impacted groundwater." Groundwater 2000 Conference, Denmark.
9. Egemen, E., Corpening, J., Padilla, J., Brennan, R., and Nirmalakhandan, N. (1997) "Evaluation of ozonation and cryptic growth for biosolids management in wastewater treatment." IAWQ Specialized Conference on Chemical Industries, South Africa.

**Conference Proceedings Refereed by Abstract:**

1. \*Eramo, A., and Brennan, R. A. (2009) "Bioremediation of hydrocarbon-contaminated soil with used mushroom compost." 51<sup>st</sup> Annual Penn State Mushroom Industry Conference, Kennett Square, PA, September 21.
2. \*Newcombe, C. E., and Brennan, R. A. (2009) "Effective and low-cost treatment of acid mine drainage using chitin as a fractional amendment to compost: batch and column tests." Poster presentation, National Meeting of the American Society of Mining and Reclamation, Billings, MT, June 2.
3. \*Robinson Lora, M. A., and Brennan, R. A. (2009) "Remediation of mine-impacted water using crab-shell chitin as an electron donor and alkalinity source." Platform presentation, In Situ and On-Site Bioremediation 10th International Symposium, May 7.
4. \*Henry, E., \*Robinson-Lora, M. A., and Brennan, R. A. (2009) "The beauty of arthropods: a comparison of crab-shell vs. insect chitin for the remediation of metal-laden waters." Poster presentation, In Situ and On-Site Bioremediation 10th International Symposium, May 7.
5. \*Newcombe, C. E., and Brennan, R. A. (2009) "Chitin as an additive to compost to enhance passive treatment of mine-impacted waters." Platform presentation, In Situ and On-Site Bioremediation 10th International Symposium, May 7.
6. \*Eramo, A., and Brennan, R. A. (2009) "Bioremediation of diesel-contaminated soil using spent mushroom compost." Platform presentation, In Situ and On-Site Bioremediation 10th International Symposium, May 7.
7. \*Newcombe, C. E., and Brennan, R. A. (2009) "Effective and low-cost treatment of acid mine drainage using chitin as a fractional amendment to spent mushroom compost." *Poster presentation (1st Place Winner in Environmental Engineering & Ecology category)*, 12th Annual Environmental Chemistry Student Symposium, The Pennsylvania State University, University Park, PA, March 27.
8. \*Eramo, A., and Brennan, R. A. (2009) "Bioremediation of diesel contaminated soil using spent mushroom compost." *Poster presentation (1st Place Winner in Ecology, Meteorology, and Engineering category)*, 12th Annual Environmental Chemistry Student Symposium, The Pennsylvania State University, University Park, PA, March 27.
9. \*Newcombe, C. E., and Brennan, R. A. (2009) "Enhanced treatment of acid mine drainage using chitin as a fractional amendment to spent mushroom compost." *Poster presentation*, College of

Engineering Research Symposium, The Pennsylvania State University, University Park, PA, March 24.

10. \*Newcombe, C. E., and Brennan, R. A. (2008) "Chitin as a fractional amendment to spent mushroom compost to enhance the efficiency and effectiveness of treatment of mine impacted water." *Poster presentation (1st Place Student Poster Award)*, National Meeting of the American Society of Mining and Reclamation, Richmond, VA, June 17.
11. \*Newcombe, C. E., and Brennan, R. A. (2008) "Increasing the efficiency of acid mine drainage treatment through enhancement of spent mushroom compost substrate with chitin." *Podium presentation (Student Research Award Recipient)*, Pennsylvania Water Environment Association 80th Annual Technical Conference & Exhibition (PennTec 2008), State College, PA, June 2.
12. \*Eramo, A., and Brennan, R. A. (2008) "Sustainable treatment of diesel contaminated sediments using spent mushroom compost." *Poster presentation (Student Research Award Recipient)*, Pennsylvania Water Environment Association 80th Annual Technical Conference & Exhibition (PennTec 2008), State College, PA, June 2.
13. \*McElhoe, J. A., and Brennan, R. A. (2008) "Spatial and temporal quantification of multiple *Dehalococcoides* strains throughout the stages of reductive TCE dechlorination." *Platform presentation*, Remediation of Chlorinated and Recalcitrant Compounds: The Sixth International Conference, Monterey, CA, May 22.
14. Evans, P. J., Titus, T., Brennan, R. A., \*Cai, H., and Fricke, R. (2008) "Perchlorate remediation in vadose zone soil by Gaseous Electron Donor Injection Technology (GEDIT)." *Platform presentation*, Remediation of Chlorinated and Recalcitrant Compounds: The Sixth International Conference, Monterey, CA, May 22.
15. Venot, C., Figueroa, L. A., Brennan, R. A., Sieczkowski, M. R., and Al-Abed, S. R. (2008) "Pilot-scale biochemical reactor treatability study for metals removal from mining influenced water." *Platform presentation*, Remediation of Chlorinated and Recalcitrant Compounds: The Sixth International Conference, Monterey, CA, May 22.
16. \*Newcombe, C. E., and Brennan, R. A. (2008) "Enhanced treatment of acid mine drainage using chitin as a fractional amendment to spent mushroom compost." *Poster presentation*, College of Engineering Research Symposium, The Pennsylvania State University, University Park, PA, April 1.
17. \*McElhoe, J. A., and Brennan, R. A. (2008) "Chemical and molecular characterization throughout the course of chitin-enhanced TCE dechlorination." *Oral presentation (2nd Place Winner in Environmental Engineering & Ecology session)*, 11th Annual Environmental Chemistry Student Symposium, The Pennsylvania State University, University Park, PA, March 29.
18. \*Eramo, A., and Brennan, R. A. (2008) "Sustainable treatment of diesel contaminated sediments using spent mushroom compost." *Poster presentation (2nd Place Winner in Environmental Engineering & Ecology category)*, 11th Annual Environmental Chemistry Student Symposium, The Pennsylvania State University, University Park, PA, March 28.
19. \*Cai, H., and Brennan, R. A. (2007) "Vadose zone treatment of perchlorate using gaseous electron donors." *Platform presentation*, In Situ and On-Site Bioremediation 9th International Symposium, Baltimore, MD, May 8.
20. \*Robinson Lora, M. A., and Brennan, R. A. (2007) "Evaluation of chitin as an electron donor source for biological nitrate reduction: column studies." *Platform presentation*, In Situ and On-Site Bioremediation 9th International Symposium, Baltimore, MD, May 8.

21. \*McElhoe, J. A., and Brennan, R. A. (2007) "Evaluation of dynamic chemical gradients during the course of trichloroethene remediation using a fermentable substrate." *Poster presentation*, In Situ and On-Site Bioremediation 9th International Symposium, Baltimore, MD, May 8.
22. †Daubert, L. N., and Brennan, R. A. (2007) "Passive remediation of acid mine drainage using chitin." *Platform presentation*, In Situ and On-Site Bioremediation 9th International Symposium, Baltimore, MD, May 7.
23. \*Robinson Lora, M. A., and Brennan, R. A. (2007) "Natural chitinous material as a neutralizing agent and electron donor source for the passive remediation of acid mine drainage." *Poster presentation*, 10th Annual Environmental Chemistry Student Symposium, The Pennsylvania State University, University Park, PA, April 13.
24. \*Cai, H., and Brennan, R. A. (2007) "Bioremediation of perchlorate in vadose zone soil using gaseous electron donors: microcosm tests." *Poster presentation*, The Graduate Exhibition, The Pennsylvania State University, University Park, PA, March 25.
25. \*McElhoe, J. A. and Brennan, R. A. (2007) "Evaluation of dynamic chemical gradients over space and time during the course of trichloroethene remediation using a fermentable substrate." *Poster presentation*, The Graduate Exhibition, The Pennsylvania State University, University Park, PA, March 25.
26. \*Robinson Lora, M. A. and Brennan, R. A. (2007) "Passive remediation of acid mine drainage using chitinous materials: microcosm and column studies on three sites within central Pennsylvania." *Poster presentation (2nd Place Winner in Engineering category)*, The Graduate Exhibition, The Pennsylvania State University, University Park, PA, March 25.
27. Brennan, R. A., \*Cai, H., \*\*Min, B., and Evans, P. J. (2006) "Treatability study for the bioremediation of perchlorate in vadose zone soils using gaseous electron donors." *Poster presentation*, Remediation of Chlorinated and Recalcitrant Compounds: The Fifth International Conference, Monterey, CA.
28. †Daubert, L. and Brennan, R. A. (2006) "A laboratory investigation of passive acid mine drainage treatment using chitin." *Poster presentation (1st Place Winner in Engineering category)*, Undergraduate Research Exhibition, The Pennsylvania State University, University Park, PA, April 5.
29. \*Robinson Lora, M. A. and Brennan, R. A. (2006) "Use of crab shell chitin as an electron donor source for biological denitrification in batch and column tests." *Platform presentation*, 9th Annual Environmental Chemistry Student Symposium. The Pennsylvania State University, University Park, PA, March 18.
30. \*Robinson Lora, M. A. and Brennan, R. A. (2006) "Biological nitrate reduction using chitin as an electron donor source." *Poster presentation*, The Graduate Exhibition, The Pennsylvania State University, University Park, PA, March 25.
31. \*McElhoe, J. and Brennan, R. A. (2005) "Optimization of chitin grade and mass loading for chloroethene bioremediation." *Poster presentation*, In Situ and On-Site Bioremediation 8th International Symposium, Baltimore, MD.
32. \*Robinson Lora, M. A. and Brennan, R. A. (2005) "Evaluation of chitin as an electron donor source for biological nitrate reduction." *Poster presentation*, 8th Annual Environmental Chemistry Student Symposium, The Pennsylvania State University, University Park, PA.

33. \*McElhoe, J. and Brennan, R. A. (2005) "Optimization of chitin grade and mass loading for chloroethene bioremediation." *Poster presentation*, 8th Annual Environmental Chemistry Student Symposium, The Pennsylvania State University, University Park, PA.
34. Brennan, R. A., Werth, C. J., and Sanford, R. A. (2004) "Tracking the growth and distribution of a chloridogenic microbial community in PCE-contaminated sediments treated with chitin." *Poster presentation*, 10th International Symposium on Microbial Ecology - ISME, Cancun, Mexico.
35. Brennan, R. A., Sanford, R. A., and Werth, C. J. (2004) "Bioremediation of tetrachloroethene using chitin: spatial and temporal effects in a 1-D column system." *Poster presentation*, Remediation of Chlorinated and Recalcitrant Compounds: The Fourth International Conference, Monterey, CA.

*Prior to Penn State:*

36. Brennan, R. A., Vera, S. M., Sanford, R. A., and Werth, C. J. (2001) "Bioremediation of perchloroethene in a column experiment using chitin fermentation." *Poster presentation*, In Situ and On-Site Bioremediation 6th International Symposium, San Diego, CA.
37. Brennan, R. A., Feinrich, E., and Scholz-Muramatsu, H. (2001) "Feasibility of sequential anaerobic-aerobic dechlorination of chlorinated ethenes in contaminated aquifers." *Poster presentation*, In Situ and On-Site Bioremediation 6th International Symposium, San Diego, CA.
38. Swanson, A. R., Brennan, R. A., Loffler, F. E., and Sanford, R. A. (1999) "Hydrogen generation, <sup>14</sup>C-acetate assimilation, and the role of the tricarboxylic acid (TCA) cycle by succinate-fed, tetrachloroethene-respiring *Desulfuromonas* sp. strain BB1." *Poster presentation*, American Society for Microbiology 99th General Meeting, Chicago, IL.
39. Brennan, R. A., Swanson, A. R., Loffler, F. E., and Sanford, R. A. (1999) "Chlorinated solvent bioremediation: a novel approach to measuring bacterial kinetics." *Platform presentation*, In Situ and On-Site Bioremediation 5th International Symposium, San Diego, CA.
40. Brennan, R. A., Swanson, A. R., Loffler, F. E., and Sanford, R. A. (1998) "Use of a solid-phase sorbent for manipulating PCE concentrations in growing cultures of the halo-respiring bacterial strain BB1." *Poster presentation*, American Society for Microbiology 98th General Meeting, Atlanta, GA.
41. Brennan, R. A., and Nirmalakhandan, N. (1996) "Air-stripping: predicting the effect of temperature on Henry's constant using a QSAR model, and analyzing the energy requirements of two competitive systems." *Poster presentation*, American Chemical Society Conference, Orlando, FL.
42. Brennan, R. A., and Nirmalakhandan, N. (1995) "Predicting the effect of temperature on Henry's constant for hazardous air pollutants." *Poster presentation*, Air & Waste Management Association Conference, San Antonio, TX.

**Research Reports to Sponsor:**

1. \*Caporuscio, A. F., and Brennan, R. A. "Passive remediation of acid precipitation in the South Branch of Kinzua Creek using crab-shell chitin: a treatability study." Final report to the Pennsylvania Fish and Boat Commission, 2009.
2. \*Eramo, A., and Brennan, R. A. "Bioremediation of diesel contaminated sediments using spent mushroom compost: microcosm tests." Final report to The California Mushroom Farm, 2008.
3. Starr, B., Lebow, P., Brennan, R. A., and Bures, G. H. "Phase II SBIR final report: bioremediation of chlorinated solvents in saturated, low permeability soils." NSF SBIR program, 2005.

*Prior to Penn State:*

4. Sorenson, K. S., Martin, J. P., Brennan, R. A., and Bures, G. H. "Phase I SBIR final report: fracing technology for remediation of chlorinated solvent source areas in low permeability media." NSF SBIR program, 2002.

### **Manuscripts Submitted for Publication:**

1. \*Eramo, A., and Brennan, R.A. "A new use for used mushroom compost: bioremediation of diesel-contaminated soil." *Mushroom News*, 2009.
2. \*Newcombe, C., and Brennan, R.A. "Improved passive treatment of acid mine drainage using crab-shell chitin as a fractional amendment to spent mushroom compost." *Journal of Environmental Engineering*, 2009.
3. \*Robinson-Lora, M. A., and Brennan, R.A. "Chitin complex for the remediation of mine impacted water: geochemistry of metal removal and comparison with other common substrates." *Applied Geochemistry*, 2009.

‡Undergraduate student supervised by Dr. Brennan

\*Graduate student supervised by Dr. Brennan

\*\*Post-doctoral student supervised by Dr. Brennan

### **Invited Seminars**

1. Brennan, R. A. (2008) "Solving a global water crisis in a local watershed: a comprehensive analysis of chitin as a multifunctional substrate for the treatment of acid mine drainage." Invited seminar, sponsored by the University of Tennessee Institute for a Secure and Sustainable Environment, Joint Institute for Biological Sciences, and the Center for Environmental Biotechnology, University of Tennessee, Knoxville, TN, April 4.
2. Brennan, R. A. (2007) "The future of multifunctional substrates in remediation design." Invited seminar, Camp Dresser & McKee, Inc. (CDM), Denver, CO, May 17.
3. Brennan, R. A. (2005) "From shrimp dinners to superfund sites: the use of chitin for the bioremediation of chlorinated solvents." Invited seminar, Earth and Environmental Engineering, Columbia University, New York, NY, March 11.
4. Brennan, R. A. (2004) "From shrimp dinners to superfund sites: the use of chitin for the bioremediation of chlorinated solvents." Invited seminar, Department of Civil and Environmental Engineering, University of Delaware, Newark, DE, September 17.

### **Research Supervision**

#### **Postdoctoral Scholars & Research Associates Supervised**

##### **Completed:**

1. **Dr. Booki Min**, "Bioremediation of perchlorate in vadose zone soil using gaseous electron donors: column study evaluation", Department of Civil & Environmental Engineering, 2005. Dr. Min is now an Assistant Research Professor at the Technical University of Denmark.

***In Progress:***

1. **Dr. Neil Brown**, "Pharmaceutical removal from wastewater using ecological processes", Department of Civil & Environmental Engineering, Penn State, 2008 – present.

**Doctoral Dissertations Supervised**

***Completed:***

1. **Dr. Mary Ann Robinson-Lora**, "Evaluation of chitinous materials as a multifunctional substrate for the remediation of mine impacted water", Department of Civil & Environmental Engineering, passed final oral defense, September 2009.

***In Progress:***

1. **Ms. Jennifer McElhoe**, "Spatial and temporal dynamics of *Dehalococcoides ethenogenes* strains BAV1, FL2, and GT in the presence of TCE and a fermentable substrate", Department of Civil & Environmental Engineering, advanced to candidacy, passed comprehensive, Ph.D. expected May 2010.
2. **Ms. Yishan Lin**, "Microbial community dynamics in mine impacted water treated with crab-shell chitin complex", Department of Civil & Environmental Engineering, Ph.D. expected December 2012.

**Masters Degrees Supervised**

***Completed:***

1. **Ms. Alessia Eramo**, "Bioremediation of diesel contaminated soil using spent mushroom compost", M.S. Environmental Engineering, August 2009.
2. **Ms. Caroline Newcombe**, "Effective and low-cost treatment of acid mine drainage using chitin as a fractional amendment to compost", M.S. Environmental Engineering, May 2009.
3. **Ms. Mary Ann Robinson-Lora**, "Biological denitrification of drinking water supplies using chitin", M.S. Environmental Engineering, August 2007.
4. **Ms. Hua Cai**, "Treatability study of in situ bioremediation of perchlorate in vadose zone soil using gaseous electron donors", M.S. Environmental Engineering, May 2007.

***In Progress:***

1. **Ms. Erin Henry**, "Ecological systems for tertiary wastewater treatment: start-up strategies for fungal mycelia", Department of Civil & Environmental Engineering, Penn State, M.S. expected August 2010.
2. **Ms. Abby Caporuscio**, "Enzymatic biocatalysis of endocrine disrupting chemicals in wastewater using *Phanerochaete chrysosporium*", Department of Civil & Environmental Engineering, Penn State, M.S. expected December 2010.
3. **Ms. Jessica Grembi**, "The effect of substrate selection on microbial ecology in passive AMD treatment systems", Department of Civil & Environmental Engineering, Penn State, M.S. expected May 2011.
4. **Ms. Natthida Binsomprasong**, "Biocatalysis of lignin and COD in pulp and paper mill effluent using symbiotic fungal mycelia", Department of Civil & Environmental Engineering, Penn State, M.S. expected May 2011.

**Undergraduate Honors Theses Supervised**

***Completed:***

1. **Ms. Linda Daubert**, "A laboratory investigation of passive remediation of acid mine drainage using chitin from crab shells", B.S. Chemical Engineering with Honors in Environmental Engineering, May 2006.

***In Progress:***

1. **Mr. Bradley Sick**, "Acid mine drainage remediation using crab shell chitin: "Klondike 1" high concentration treatability study", B.S. Civil Engineering with Honors in Environmental Engineering, expected May 2010.

## **Courses Taught at Penn State**

- CE 370, Introduction to Environmental Engineering  
Semesters: SP 2004, SP 2005, SP 2006, FA 2006, SP 2007
- CE 476, Solid and Hazardous Wastes  
Semesters: FA 2007, SP 2009
- CE 497, Applied Field Methods for Environmental Engineering  
Semesters: FA 2008, FA 2009
- CE 578, Groundwater Remediation  
Semesters: FA 2004, FA 2006, SP 2008

## **Professional Registration**

Certified Engineer-in-Training, E.I. Certificate No. 5247 (1997)

## **Professional Membership & Service**

### ***Membership:***

- Member, Pennsylvania Water Environment Association (2008 – present)
- Member, American Society for Mining & Reclamation (2008 – present)
- Member, American Society for Microbiology (2005 – present)
- Member, Association of Environmental Engineering and Science Professors (2005 – present)
- Member, American Society of Engineering Education (2002 – present)
- Member, American Chemical Society (1999 – present)
- Member, American Geophysical Union (2000 – 2002)

### ***Committee Work:***

- Member, Research Committee, Pennsylvania Water Environment Association (2008 – present)
- Member, Mining Waste Team, Interstate Technology & Regulatory Council (2008 – present)
- Member, Student Services Committee, Association of Environmental Engineering and Science Professors (2007 – 2008)

### ***Reviewer (Proposals):***

- NSF Engineering Research Centers Program
- NSF Environmental Sustainability Unsolicited Panel
- United States-Israel Binational Science Foundation
- USDA, Cooperative State Research, Education, and Extension Service Small Business Innovation Research Program in Soil and Water Resources
- Moldovan Travel Fellowship Program of the U.S. Civilian Research and Development Foundation
- Azerbaijan University Research and Education Program of the U.S. Civilian Research and Development Foundation and the Azerbaijan National Science Foundation
- Maryland Agricultural Experiment Station at the University of Maryland

### ***Reviewer (Journals):***

- Water Research
- Water Environment Research
- Journal of Hazardous Materials
- Environmental Engineering Science
- International Journal of Hydrogen Energy
- ASCE Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management

### ***Reviewer (Books):***

- Introduction to Environmental Engineering textbook for Thomson Engineering
- Fate and Transport of Contaminants textbook for College Publishing

## **Service to Penn State University**

### ***Department:***

Member, Undergraduate Committee, Civil & Environmental Engineering (2009 – present)  
Chair, Website Committee, Civil & Environmental Engineering (2006 – 2008)  
Member, Climate Committee, Civil & Environmental Engineering (2004 – 2006)

### ***College:***

Advisor, Environmental Engineering Minor (2007 – present)  
Review session for Fundamentals of Engineering Exam (2006 – present)

### ***University:***

Judge, Environmental Chemistry Student Symposium (2004, 2008)  
Judge, Graduate Research Exhibition (2006)  
Judge, Undergraduate Research Exhibition (2005)  
Reviewer, Mindbend (2005)  
Co-advisor, Environmental Engineering Society (2004 – 2006)

## **Service to Government, Business, & Industry**

### ***Governmental Agencies:***

Consultant, Technical Support Center of the U.S. Environmental Protection Agency (March 2007 – September 2008)

### ***Business and Industry:***

Consultant, HN Automotive, Inc. (March 2007 – September 2007)