

Derick G. Brown
Class of 1961 Associate Professor

Department of Civil & Environmental Engineering
Fritz Engineering Laboratory, Lehigh University
13 East Packer Avenue
Bethlehem, Pennsylvania 18015
(610) 758-3543 dgb3@lehigh.edu

Education and Professional Background

Education:

- Ph.D. Civil and Environmental Engineering, Princeton University, 2000
- M.A. Civil and Environmental Engineering, Princeton University, 1996
- M.S. Mechanical Engineering, University of California, Irvine, 1992
- B.S. Aerospace Engineering, Boston University, 1986

Registration:

- Professional Engineer, State of Pennsylvania.
- Professional Engineer, State of California.

Research and Work Experience:

- 2007-Present Associate Professor, Lehigh University
- 2001-2007 Assistant Professor, Lehigh University
- 2000-2001 Research Associate, Princeton University
- 1994-2000 Research Assistant, Princeton University
- 1994 Technical Consultant, McDonnell Douglas Space Systems Company
- 1993-1994 Senior Project Engineer, Multimedia Environmental Technology, Inc.
- 1986-1993 Technical Specialist, McDonnell Douglas Space Systems Company

Awards and Honors:

- Class of 1961 Associate Professorship, 2009-2011
- Frank S. Hook Assistant Professorship, 2004-2006
- The Lehigh Engineering Ingenuity Award for Exceptional Accomplishment in Teaching and/or Research for Junior Faculty, 2004
- National Science Foundation CAREER Award, 2002
- P.C. Rossin Assistant Professorship, 2001-2003
- Princeton Environmental Institute Research Initiative in Science and Engineering Fellowship, 1997.
- McDonnell Douglas Space Systems Company's General Manager's Award, 1989.
- McDonnell Douglas Independent Research and Development Awards, 1989 & 1991.

Affiliated Programs at Lehigh:

- Lehigh Environmental Initiative
- Bioengineering Program

Professional Society Memberships:

- American Chemical Society (ACS)
- American Geophysical Union (AGU)
- American Society of Civil Engineers (ASCE), Member
- American Society for Microbiology (ASM)
- Association of Environmental Engineering and Science Professors (AEESP)
- Member, Education Committee
- International Society for Subsurface Microbiology (ISSM)
- Sigma Xi Scientific Research Society (Sigma Xi)
- Tau Beta Pi Engineering Honor Society (TBP)

Patents:

- Method and Apparatus for Characterizing Coal Tar in Soil. H.K. Moo-Young, D.G. Brown and A. Coleman. Patent #7393689.

Teaching

Undergraduate Courses:

- CEE 12 Civil Engineering Statistics
- CEE 272 Environmental Risk Assessment
- CEE 290 Senior Capstone Design (Environmental/Hydrology Project)
- CEE 375 Environmental Engineering Processes
- CEE 376 Environmental Biotechnology
- CEE 377 Environmental Engineering Design Project

Graduate Courses:

- CEE 471 Environmental Risk Assessment
- CEE 476 Environmental Engineering Microbiology
- CEE 477 Environmental Engineering Processes

Publications and Presentations

Peer-Reviewed Journal Publications:

Hong, Y. and Brown, D.G. In Press. "Alteration of bacterial surface electrostatic potential and pH upon adhesion to a solid surface and impacts to cellular bioenergetics." *Biotechnol. Bioeng.*

Hong, Y. and Brown, D.G. 2009. "Variation in bacterial ATP level and proton motive force due to adhesion to a solid surface." *Appl. Environ. Microbiol.*, 75(8):2346-2353

Cao, J., Zhang, W.-X., Brown, D.G., and Sethi, D. 2008. "Oxidation of lindate with Fe(II)-activated sodium persulfate." *Environ. Engr. Sci.*, 25(2):221-228.

- Hong, Y. and Brown, D.G. 2008. "Electrostatic behavior of the charge-regulated bacterial cell surface." *Langmuir*, 24(9):5003-5009.
- Tripathi, S. and Brown, D.G. 2008. "Effects of linear alkylbenzene sulfonate on the sorption of Brij 30 and Brij 35 onto aquifer sand." *Environ. Sci. Technol.*, 42(5):1492-1498.
- Abramson, A. and Brown, D.G. 2007. "Influence of solution ionic strength on the collision efficiency distribution and predicted transport distance of a *Sphingomonas* sp. flowing through porous media." *Water Res.*, 41(19):4435-4445.
- Brown, D.G. 2007. "Relationship between micellar and hemi-micellar processes and the bioavailability of surfactant-solubilized hydrophobic organic compounds." *Environ. Sci. Technol.*, 41(4):1194-1199.
- Brown, D.G. 2007. "Adaptable method for estimation of parameters describing bacterial transport through porous media from column effluent data: Optimization based on data quality and quantity." *Coll. Surf. A: Physiochem. Engr. Aspects*, 296(1-3):19-28.
- X. Li, Brown, D.G., Zhang, W. 2007. "Zero-valent iron nanoparticles for stabilization of biosolids." *J. Nanoparticle Res.*, 9(2):233-243.
- Hong, Y. and Brown, D.G. 2006. "Cell surface acid-base properties of *Escherichia coli* and *Bacillus brevis* and variation as a function of growth phase, nitrogen source and C:N ratio." *Coll. Surf. B: Biointerfaces*, 50(2):112-119.
- Brown, D.G., Gupta, L., Kim, T.-H., Moo-Young, H.K., and Coleman, A.J. 2006. "Comparative assessment of coal tars obtained from 10 former manufactured gas plant sites in the eastern United States." *Chemosphere*, 65(9):1562-1569.
- Brown, D.G. and Abramson, A. 2006. "Collision efficiency distribution of a bacterial suspension flowing through porous media and implications for field-scale transport." *Water Res.*, 40(8):1591-1598.
- Brown, D.G. and Abramson, A. 2007. Erratum to "Collision efficiency distribution of a bacterial suspension flowing through porous media and implications for field-scale transport." [*Water Res.*, 40(8):1591-1598], *Water Res.*, 41(3):719.
- Brown, D.G. and Jaffé, P.R. 2006. "Effects of nonionic surfactants on the cell surface hydrophobicity and apparent Hamaker constant of a *Sphingomonas* sp." *Environ. Sci. Technol.*, 40(1):195-201.
- Brown, D.G. and Al Nuaimi, K.S. 2005. "Nonionic surfactant sorption onto the bacterial cell surface: A multi-interaction isotherm." *Langmuir*, 21(24):11368-11372.
- Brown, D.G., Gupta, L., Moo-Young, H.K. and Coleman, A. 2005. "Raoult's law-based method for determination of coal tar average molecular weight." *Environ. Toxicol. Chem.* 24(8):1886-1892.
- Brown, D.G., Komlos, J. and Jaffé, P.R. 2005. "Simultaneous utilization of acetate and hydrogen by *Geobacter sulfurreducens* and implications for use of hydrogen as an indicator of redox conditions." *Environ. Sci. Technol.*, 39(9):3069-3076.
- Dong, H., Onstott, T.C., Ko, C.-H., Hollingsworth, A.D., Brown, D.G., and Mailloux, B.J. 2002. "Theoretical prediction of collision efficiency between adhesion-deficient bacteria and sediment grain surface." *Coll. Surf. B: Biointerfaces*, 24(3-4):229-245.
- Brown, D.G., Stencel, J.R., and Jaffé, P.R. 2002. "Effects of porous media preparation on bacteria transport through laboratory columns." *Water Res.*, 36:105-114.
- Brown, D.G., and Jaffé, P.R. 2001. "Effects of nonionic surfactants on bacterial transport through porous media." *Environ. Sci. Technol.*, 35(19):3877-3883.

Brown, D.G., and Jaffé, P.R. 2001. "Effects of nonionic surfactants on the UV/Visible absorbance spectrum of bacterial cells." *Biotechnol. Bioeng.*, 74(6):476-482.

Brown, D.G., and Jaffé, P.R. 2001. "Spectrophotometric Assay of POE Nonionic Surfactants and its Application to Surfactant Sorption Isotherms." *Environ. Sci. Technol.*, 35(10):2022-2025.

Brown, D.G., Knightes, C.D., and Peters, C.A. 1999. "Risk assessment for polycyclic aromatic hydrocarbon NAPLs using component fractions." *Environ. Sci. Technol.*, 33(24):4357-4363.

Peters, C.A., Knightes, C.D., and Brown, D.G. 1999. "Long-term compositional dynamics of PAH-containing NAPLs and implications for risk assessment." *Environ. Sci. Technol.*, 33(24):4499-4507.

Brown, D.G., Guha, S., and Jaffé, P.R. 1999. "Surfactant-enhanced biodegradation of a PAH in soil slurry reactors." *Bioremediation J.*, 3(3):269-283.

Peer-Reviewed Technical Reports:

Brown, D.G., Lanzon, J.B. and Brenner, L.M. 2008. Use of Natural Peat to Remediate Contaminated Water at Manufactured Gas Plant Sites. EPRI, Palo Alto, CA. 1016863.

Brown, D.G. and S. Tripathi. 2004. Microbial Ecology of Permeable Reactive Barriers. EPRI, Palo Alto, CA. 1009505.

Brown, D.G., L. Gupta, M. Guay, C. Ferland, G. Tsouprake. 2004. Coal Tar Treatability Test Program. Chemical oxidation effects on dense non-aqueous phase liquid using potassium permanganate. EPRI, Palo Alto, CA. 1005288.

Moo-Young, H.K., D.G. Brown, X. Mo, R. Waterman. 2004. Development of a Coal Tar Residual Saturation (Res-SAT) Field Tool(TM) for Manufactured Gas Plant Sites. EPRI, Palo Alto, CA. 1005285.

Moo-Young, H.K., D.G. Brown, T.H. Kim, and L. Gupta. 2004. Laboratory Assessment of Leaching Potential of Coal Tar at MGP Sites. EPRI, Palo Alto, CA. 1009425.

Moo-Young, H.K., D.G. Brown, T.H. Kim, and L. Gupta. 2004. Leaching Potential of Coal Tar at a MGP Site: A Laboratory Assessment. EPRI, Palo Alto, CA.

Proceedings:

Brown, D.G., S. Guha, and P.R. Jaffé. 1997. "Modeling biodegradation of phenanthrene in the presence of nonionic surfactant." in *In Situ and On-Site Bioremediation*, A. Leeson and B.C. Alleman (eds.), Vol. 2, pp 581-586, Battelle Press, Columbus, OH.

Brown, D.G. and Stone, K.W. 1993. "High accuracy/low cost tracking system for solar concentrators using a neural network." in *Proceedings of the 28th Intersociety Energy Conversion Engineering Conference, Part 2*, pp 577-584, SAE, Warrendale, PA.

Ph.D. Dissertation:

Brown, D.G. 2000. Effects of nonionic surfactants on bacterial transport through porous media. Department of Civil & Environmental Engineering, Princeton University, Princeton, NJ. (UMI Digital Dissertations).

Invited Seminars/Presentations/Workshops/Session Chairs:

Brown, D.G., "Relationship between bacterial adhesion to a surface and cellular bioenergetics." Presented to the Department of Geology, University at Buffalo, Buffalo, NY, 8 October 2009.

Session Chair, Mechanistic Investigations II: Synthesis of Multiple Factors that Impact Microbial Transport in Porous Media. 1st International Conference on Microbial Transport and Survival in the Subsurface, 10-13 May 2009, Niagara on the Lake, Canada.

Session Chair, Trace Contaminants in Water: Genesis, Rapid Detection and Sustainable Removal Processes - Inorganic and Pharmaceutical Trace Contaminants in Water. AIChE Annual Meeting, 16-21 November, 2008, Philadelphia, PA.

Panel Member, NSF CAREER Workshop, AEESP Conference, 28 July - 1 August, 2007, Virginia Tech, Blacksburg, VA.

Brown, D.G. "Advancements in permeable reactive barriers applicable to former MGP sites." EPRI MGP Mid-Year Workshop, Bethlehem, PA. June 13-14, 2007.

Brown, D.G. Research seminar presented to the Department of Civil & Environmental Engineering, Lafayette College, 10 November 2006.

Brown, D.G. Research seminar presented to the Department of Civil & Environmental Engineering, University of Delaware, 20 October 2006.

Brown, D.G. Research seminar presented to the Department of Civil & Environmental Engineering, Carnegie Mellon University, 9 December 2005.

Brown, D.G. and S. Tripathi. "Microbial ecology of permeable reactive barriers." EPRI Advisory Conference, Monterey, CA. February 2-4, 2004.

Brown, D.G. and L. Gupta. "Chemical oxidation effects on coal tar interfacial mass transfer rates." EPRI Advisory Conference, Monterey, CA. February 2-4, 2004.

Moo-Young, H.K. and D.G. Brown. "Development of the Res-SAT Field Tool™." EPRI Advisory Conference, Monterey, CA. February 2-4, 2004.

Brown, D.G. "Microbial ecology of permeable reactive barriers." EPRI Advisory Conference, San Antonio, TX, September 9-10, 2003.

Brown, D.G. and L. Gupta. "Chemical oxidation effects on coal tar interfacial mass transfer rates." EPRI Advisory Conference, San Antonio, TX, September 9-10, 2003.

Session Chair, Colloidal and Interfacial Phenomena in Aquatic Environment Symposium II: Colloids. 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19-21, 2000.

Conference Presentations:

Brown, D.G. and Hong, Y., "Relationship between bacterial adhesion to a surface and cellular bioenergetics." To be presented to the 13th IACIS International Conference on Surface and Colloid Science and 83rd ACS Colloid and Surface Science Symposium, 14-19 June, 2009, Columbia University, New York.

Brown, D.G. and Tripathi, S., "Bacterial transport through unsaturated porous media in the presence of anionic and nonionic surfactants." To be presented to the 13th IACIS International Conference on Surface and Colloid Science and 83rd ACS Colloid and Surface Science Symposium, 14-19 June, 2009, Columbia University, New York.

Brown, D.G. and Hong, Y., "Variation of bacterial metabolic activity upon adhesion to a solid surface." Presented to the 1st International Conference on Microbial Transport and Survival in the Subsurface, 10-13 May, 2009, Niagara on the Lake, Canada.

Brown, D.G. and Tripathi, S., "Impacts of nonionic and anionic surfactants on bacterial transport through unsaturated porous media." Presented to the 1st International Conference on Microbial Transport and Survival in the Subsurface, 10-13 May, 2009, Niagara on the Lake, Canada.

Brown, D.G., "Relationship between micellar and hemi-micellar processes and the bioavailability of surfactant-solubilized hydrophobic organic compounds." Presented to the AIChE Annual Meeting, 16-21 November, 2008, Philadelphia, PA.

Hong, Y. and Brown, D.G., "Effects of adhesion on bacterial metabolic activity." Presented to the 235th American Chemical Society National Meeting & Exposition. 6-10 April, 2008. New Orleans, Louisiana.

Hong, Y. and Brown, D.G., "Electrostatic behavior of the charge-regulated bacterial cell surface." Presented to the 235th American Chemical Society National Meeting & Exposition. 6-10 April, 2008. New Orleans, Louisiana.

Tripathi, S. and Brown, D.G., "Effects of surfactants on bacterial transport through unsaturated porous media." Presented to the 235th American Chemical Society National Meeting & Exposition. 6-10 April, 2008. New Orleans, Louisiana.

Tripathi, S. and Brown, D.G., "Inactivation of E. coli at the air/water interface." Presented to the Joint International Symposia for Subsurface Microbiology (ISSM 2005) and Environmental Biotechnology (ISEB XVII). 14-19 August, 2005. Jackson Hole, Wyoming.

Abramson, A. and Brown, D.G., "Collision efficiency distribution of a bacterial suspension flowing through porous media and implications for field-scale transport." Presented to the Joint International Symposia for Subsurface Microbiology (ISSM 2005) and Environmental Biotechnology (ISEB XVII). 14-19 August, 2005. Jackson Hole, Wyoming.

Brown, D.G. "Determination of the collision efficiency distribution of a colloidal suspension flowing through a packed bed." American Chemical Society 229th Spring National Meeting, San Diego, CA, March 13-17, 2005.

Jaffé, P.R., D.R. Lovley, J. Komlos and D.G. Brown. "Hydrogen as an indicator to assess biological activity during trace-metal bioremediation." 7th Annual NABIR PI Workshop, Warrenton, VA, March 15-17, 2004.

Komlos, J., P.R. Jaffé, D.G. Brown and D.R. Lovley. "Hydrogen as an indicator to assess biological activity during bioremediation under dual electron donor conditions." 34th Mid-Atlantic Industrial and Hazardous Waste Conference, Cook College, Rutgers University, New Brunswick, NJ, September 20-21, 2002.

Jaffé, P.R., J. Komlos, D.G. Brown and D.R. Lovley. "Hydrogen as an indicator to assess biological activity during trace-metal bioremediation." AGU Spring Meeting, Washington, DC, May 28-31, 2002.

Jaffé, P.R., D.G. Brown, J. Komlos and D.R. Lovley. "Hydrogen as an indicator to assess biological activity during trace-metal bioremediation." 5th Annual NABIR PI Workshop, Warrenton, VA, March 18-20, 2002.

Brown, D.G. and P.R. Jaffé. "Effects of nonionic surfactants on bacterial transport through porous media." Presented to the American Geophysical Union 2001 Fall Meeting, San Fransisco, CA, December 10-14, 2001.

Rainwater, J.L., D.G. Brown and P.R. Jaffé. "Design of surfactant-enhanced bioslurry reactors: laboratory experiments and simulations." Presented to the Hazardous Substance Research Center Conference, Pacific Grove, CA, July 9-12, 2000.

Brown, D.G. and P.R. Jaffé. "Effects of nonionic surfactants on bacterial transport through porous media." Presented to the 74th Colloid and Surface Science Symposium, Lehigh University, Bethlehem, PA, June 19-21, 2000.

Brown, D.G. and P.R. Jaffé. "Operational regimes for surfactant-enhanced PAH biodegradation." Presented to the 1999 International Symposium on Subsurface Microbiology, Vail, CO, August 22-27, 1999.

Brown, D.G., J.R. Stencel, and P.R. Jaffé. "Bacteria transport in sand column experiments: effect of media preparation." Presented to the 1999 International Symposium on Subsurface Microbiology, Vail, CO, August 22-27, 1999.

Peters, C.A., C.D. Knightes, and D.G. Brown. "Long-term composition dynamics of PAH-containing NAPLs and implications for risk assessment." Presented to the 1999 Conference on Hazardous Waste Research, St. Louis, MO, May 25-27, 1999.

Brown, D.G. and P.R. Jaffé. "Effects of surfactants on bacterial transport through a porous media." Presented to the 5th International In Situ and On-Site Bioremediation Symposium, San Diego, April 19-22, 1999.

Brown, D.G., J.R. Stencel, and P.R. Jaffé. "Porous media preparation for bacteria filtration experiments using sand columns." Presented to the New Jersey American Water Works Association Annual Conference, Atlantic City, March 24-25, 1999. Received Paper Award.

Brown, D.G., S. Guha, and P.R. Jaffé. "Modeling biodegradation of phenanthrene in the presence of nonionic surfactant." Presented to the 4th International In Situ and On-Site Bioremediation Symposium, New Orleans, April 28-May 1, 1997.

Sun, S., S. Guha, D.G. Brown, and P.R. Jaffé. "The effect of a surfactant's hydrophilic chain length on the surfactant-enhanced mass transfer between an organic and an aqueous phase." Presented to the I&EC Special Symposium, American Chemical Society, Birmingham, AL, September 9-11, 1996.

Brown, D.G. and Stone, K.W. "A High Accuracy/Low Cost Tracking System for Solar Concentrators Using a Neural Network", presented to the 28th Intersociety Energy Conversion Engineering Conference, Atlanta, Georgia, August 1993.

Blackmon, J.B., McNichols, J.L., Brown, D.G., and Drubka, R.E. "Liquid Droplet Radiator: Environmental Interactions", presented to the 7th Annual Space Power Workshop, Air Force Space Command, El Segundo, CA, April 1989.

Blackmon, J.B., and Brown, D.G. "Liquid Droplet Radiator Systems Analysis", presented to the LDR Workshop, Air Force Astronautics Laboratory, Edwards AFB, December 1988. (Invited)

Blackmon, J.B., Brown, D.G., and Drubka, R.E. "Liquid Droplet Radiator Development", presented at the 5th Symposium on Space Nuclear Power Systems, Albuquerque, NM, January 1988.