

CURRICULUM VITA

BRIAN H. DAVISON

Oak Ridge National Laboratory
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RESEARCH INTERESTS

Bioconversion of renewable resources into fuels and chemicals (ethanol, organic acids, solvents), Hybrid processes (catalytic upgrading), Systems analysis of microbes (cultivation and proteomics), Non-aqueous biocatalysis, Biofiltration of VOCs, Bioremediation of chlorinated organics, Bioreactor modeling (mass transfer and kinetics), Immobilization of microbes and enzymes, Biosorption of metals, Extractive fermentations.

PROFESSIONAL EXPERIENCE

Oak Ridge National Laboratory, Chief Scientist for Systems Biology and Biotechnology, 2006–Present

Lead Lab-wide initiatives in Systems Biology and in Bioenergy. Serve as Chief Science Officer for the Center for Bioenergy Innovation (cbi.ornl.gov). Served as Science Coordinator for integration for the BioEnergy Science Center, www.bioenergyscience.org. Coordinated successful proposals for the Bioenergy Science Center and other projects. Manage internal investment portfolio and develop new programs, staff and teams in these focus areas. Research in biomass conversion, microbial cultivation and nonaqueous enzymes. Co-developed technology in catalytic upgrading of ethanol into hydrocarbons, which is licensed to Vertimass. Chief Scientist for Genomic Sciences for the U.S. DOE Biological and Environmental Research Office (2009–2011). Serve as Chair of the Institutional Biosafety Committee since 2001.

Oak Ridge National Laboratory, Director, Life Sciences Division, 2004–2005

Management of active research division consisting of 100 staff members in addition to students and subcontractors. Continued research while assisting multiple initiatives for genomics, national biosecurity, and sensors.

Oak Ridge National Laboratory, Senior Biochemical Engineer and Group Leader, 1995–2001, Distinguished Researcher and BioChemical Engineering Research Group Leader, 2002–2003

Research and Development (R&D) activities expanded in areas listed with programmatic responsibilities, supervision, and support of 5 to 15 research staff members including postdocs, technicians, and students. Managed more than ten research projects. Project Team Leader of the Alternative Feedstocks Program which involved coordination for interdisciplinary multilab teams with industrial partners for demonstration of an economic process to convert renewables into commodity chemicals (i.e., succinic acid). Other projects include: nonaqueous biocatalysis, biofiltration and ethanol fermentation with experimental planning and modeling. Served as Co-Chair of the 15th to 26th *Symposia on Biotechnology for Fuels and Chemicals*. Assisted in several lab-wide initiatives (e.g., Bioenergy/Bioproducts, chemical warfare decontamination, biological CO₂ sequestration). Operated a 500-L fermentor as Manager for ORNL's Bioprocessing User Facility 1992–2003.

Oak Ridge National Laboratory, Biochemical Engineer II, 1990–1995

R&D on bioprocessing with increased supervisory duties. Projects included immobilized-cell bioreactors, extractive fermentation of butanol, biomethanogenesis, conversion of wastepaper, and collaborations with outside researchers and private industry. Assisted in the development of a predictive model for the fluidized-

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bed bioreactor. Responsible for interface of research and maintenance staff in preparation for major external Environmental Safety and Health inspection while serving as Local Facility Supervisor for two years.

Oak Ridge National Laboratory, Biochemical Engineer I, 1985–1990

Research emphasized experiments and modeling of immobilized-cell fluidized-bed bioreactors. Designed and tested bioreactors for ethanol production and for simultaneous fermentation and separation of organic acids. This included scale-up (to a 10-ft column) and the use of industrial feedstocks.

University of Tennessee-Knoxville, Faculty – Bredesen Center, University of Tennessee/ORNL, 2010

– Present, degree program in energy, two graduate students and numerous committees.

Adjunct Professor of Chemical and Biological Engineering, 1988–Present; Instructor of graduate courses in Biochemical Engineering including supervision of three Ph.D. students and four Masters students.

EDUCATION

Ph.D. Chemical Engineering, California Institute of Technology, Pasadena, California, 1985.

Thesis topic: “*Dynamics and Coexistence of Mixed Microbial Cultures.*” Stable coexistence of competing microorganisms (*E. coli* and *S. cerevisiae*) in chemostats.

Thesis Advisor: Dr. Gregory N. Stephanopoulos

B.S.E. Chemical Engineering, with honors, University of Rochester, Rochester, New York, 1979.

AWARDS and HONORS

UT-Battelle Individual Achievement in Technology Transfer, ORNL, 2018.

Fellow, Society for Industrial Microbiology and Biotechnology (SIMB), 2017.

Fellow, American Institute of Chemical Engineers (AIChE), 2016.

Secretary of Energy’s Honor Achievement Award for “The WIPP Technical Assessment Team (TAT) and Accident Investigation Board (AIB),” 2015.

UT-Battelle Science Communicator of the Year, ORNL, 2010.

Charles D Scott Award for distinguished contributions to the field of biotechnology for fuels and chemicals, Society for Industrial Microbiology, Symposium on Biotechnology for Fuels and Chemicals, 2006.

College of Fellows, American Institute for Medical and Biological Engineering (AIMBE), 2006.

R&D100 Award for “Production of Chemicals from Biologically Derived Succinic Acid,” *Research & Development Magazine*, 1997. This technology was licensed for commercialization by BioAmber.

Management Achievement Award, Life Sciences Division, ORNL, 2002.

Significant Event Award for “Expression of Lignin Peroxidase in Yeast,” ORNL, 2000.

Significant Event Award for “Dry Enzyme Catalysis,” ORNL, 2000.

Technology Maturation Award for Succinic Acid Process, ORNL, 1999.

Technical Achievement Award for “Innovative Research Leading to the Development of the Biparticle Fluidized-Bed Bioreactor,” Martin Marietta Energy Systems, Inc., 1992.

Distinguished Writing Award for Scholarly Articles (First place) by the Society for Technical Communication - East Tennessee, 1991.

Significant Event Award for “High Productivity, Ethanol Fermentation,” Martin Marietta Energy Systems, 1987.

Outstanding Graduating Engineer, University of Rochester, 1979.

Wilson Scholar, University of Rochester, 1975–1979.

AIChE Outstanding Junior Chemical Engineer, University of Rochester, 1978.

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National Merit Scholarship, 1975.

PROFESSIONAL AFFILIATIONS

American Institute of Chemical Engineers: Fellow (chaired symposia and sessions)

Society for Biological Engineering Board of Directors - AIChE (2012–on).

American Chemical Society (chaired symposia and sessions and served on several BIOT committees).

Society for Industrial Microbiology.

Chair, Symposium on Biotechnology for Fuels and Chemicals and editor of the Proceedings in *Appl. Biochem. Biotechnol.*, (1994–2005). Organizing Committee (2006–2012). The Symposium grew from 150 to 400 attendees during my twelve years as chair.

Editorial Boards: *Biotechnol for Biofuels* (2018–present); *J Industrial Biotechnology* (2011–Present).

Advisory boards: NSERC Bioconversion Network for Guelph and Univ. British Columbia (2009–2015).

BBSRC Sustainable Bioenergy Centre (BSBEC), United Kingdom (2010–2015).

C3 Bio EFRC, Purdue University (2012–on).

Southeast Agriculture and Forestry Energy Resources Alliance (2007–2010).

Co-Organizer for the USDOE “Biomass to Biofuels” Workshop, December 2005. “Breaking the Biological Barriers to Cellulosic Ethanol,” DOE/SC-0095.

Participant in “Microbial Production of Energy” Colloquium, March 10–12, 2006, San Francisco, California. Report by American Academy of Microbiology.

JOURNAL PUBLICATIONS (Includes Journal Published, Peer Reviewed, Conference Proceedings)

Erica L. Gjersing, Bryon S. Donohoe, Brian H. Davison, Gerald A. Tuskan, Wellington Mucharo, Robert W. Sykes, Stephen R. Decker and Mark F. Davis, “Plant Cell Wall Chemical Composition Governs Cell Wall Rigidity and Biomass Recalcitrance” (submitted)

Riddhi Shah, Shixin Huang, Sai Venkatesh Pingali, Daisuke Sawada, Yunqiao Pu, Miguel Rodriguez, Jr., Arthur J. Ragauskas, Seong H. Kim, Barbara R. Evans, Brian H. Davison, and Hugh O’Neill. “Hemicellulose–Cellulose Composites Reveal Differences in Cellulose Organization after Dilute Acid Pretreatment,” *Biomacromol* 20:893-903 (2019). <https://doi.org/10.1021/acs.biomac.8b01511>

Barbara R. Evans, Marcus Foston, Hugh M. O’Neill, David Reeves, Caroline Rempe, Kathi McGrath, Arthur J. Ragauskas, Brian H. Davison. “Production of deuterated biomass by cultivation of *Lemna minor* (duckweed) in D₂O.” *Planta* 249(5):1465–1475. (2019) DOI: 10.1007/s00425-019-03097-3

Evert K. Holwerda, Robert S. Worthen, Ninad Kothari, Ronald C. Lasky, Brian H. Davison, Chunxiang Fu, Zeng-Yu Wang, Richard A. Dixon, Ajaya K. Biswal, Debra Mohnen, Richard S. Nelson, Holly L. Baxter, Mitra Mazarei, Wellington Muchero, Gerald A. Tuskan, Charles M. Cai, Erica E. Gjersing, Mark F. Davis, Michael E. Himmel, Charles E. Wyman, Paul Gilna and Lee R. Lynd. “Multiple levers for overcoming the recalcitrance of lignocellulosic biomass,” *Biotechnol. for Biofuels* 12:15 (2019). doi.org/10.1186/s13068-019-1353-7.

Hu, Michael, Bischoff, Brian; Morales-Rodriguez, Marissa; Gray, Kevin; Davison, Brian; “Superhydrophobic or hydrophilic porous metallic/ceramic tubular membranes for continuous separations of biodiesel/water W/O and O/W emulsions,” *Ind. Eng. Chem. Res.* 58:1114-1122 (2019). [doi:10.1021/acs.iecr.8b04888](https://doi.org/10.1021/acs.iecr.8b04888)

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Samarthya Bhagia, Yunqiao Pu, Barbara R. Evans, Brian H. Davison, Arthur J. Ragauskas. "Hemicellulose characterization of deuterated switchgrass." *Bioresource Technol.* 269:567-570 (2018). doi.org/10.1016/j.biortech.2018.08.034.

Kyle Sander, Daehwan Chung, Doug Hyatt, Janet Westpheling, Dawn M. Klingeman, Miguel Rodriguez Jr., Nancy L. Engle, Timothy J. Tschaplinski, Brian H. Davison, Steven D. Brown. "Rex in *Caldicellulosiruptor bescii*: Novel Regulon Members and its Effect on the Production of Ethanol and Overflow Metabolites." *Microbiol. Open* 8:e00639 (2019) DOI: 10.1002/mbo3.639

Arkin, AP, Cottingham, RW, ..., Davison BH, et al. (81 co-authors), "The DOE System Biology Knowledgebase Project (KBase)" *Nature Biotechnol.* 36:566. doi: 10.1038/nbt.4163 (2018).

Daisuke Sawada, Udaya Kalluri, Hugh O'Neill, Volker Urban, Paul Langan, Brian Davison, Sai Venkatesh Pingali. "Tension wood structure and morphology conducive for better enzymatic digestion." *Biotechnol for Biofuels*, 11:44 (2018) doi: 10.1186/s13068-018-1043-x

Gbekeloluwa B. Oguntimein, Miguel Rodriguez, Jr., Alexandru Dumitrache, Todd Shollenberger, Stephen R. Decker, Brian H. Davison, and Steven D. Brown. "Anaerobic Microplate Assay for Direct Microbial Conversion of Switchgrass and Avicel using *Clostridium thermocellum*." *Biotech. Lett.* 40(2): 303-308. DOI: 10.1007/s10529-017-2467-2 (2018)

Derya Vural, Catalin Gainaru, Hugh O'Neill, Yunqiao Pu, Micholas Dean Smith, Sai Venkatesh Pingali, Eugene Mamontov, Brian H. Davison, Alexei P. Sokolov, Arthur J. Ragauskas, Jeremy C. Smith, Loukas Petridis. "Impact of hydration and temperature history on the structure and dynamics of lignin," *Green Chem.* 20(7): 1602-1611 (2018) DOI: 10.1039/c7gc03796a

Yoo, CG; Dumitrache, A; Muchero, W; Natzke, J; Akinosho, H; Li, M; Sikes, RW; Brown, SD; Davison, B; Tuskan, GA; Pu, YQ; Ragauskas, AJ. "Significance of Lignin S/G Ratio in Biomass Recalcitrance of *Populus trichocarpa* Variants for Bioethanol Production." *ACS Sust. Chem. Engr.* 6(2): 2162-2168 DOI: 10.1021/acssuschemeng.7b03586 (2018)

Ajaya K. Biswal, MA Atmodjo, M Li, HL Baxter, CG Yoo, Y Pu, Y-C Lee, M Mazarei, IM Black, J-Y Zhang, H Ramanna, AL Bray, ZR King, PR LaFayette, S Pattathil, BS Donohoe, SS Mohanty, D Ryno, K Yee, OA Thompson, M Rodriguez Jr, A Dumitrache, J Natzke, K Winkeler, C Collins, X Yang, L Tan, RW Sykes, EL Gjersing, A Ziebell, GB Turner, SR Decker, MG Hahn, BH Davison, MK Udvardi, J Mielenz, MF Davis, RS Nelson, WA Parrott, AJ Ragauskas, CN Stewart, Jr. and D Mohnen. "Sugar release and growth of biofuel crops are improved by downregulation of pectin biosynthesis," *Nature Biotechnol.* (2018) doi:10.1038/nbt.4067.

Baxter, Holly, Mitra Mazarei, Alexandru Dumitrache, Jace Natzke, Miguel Rodriguez, Jiqing Gou, Chunxiang Fu, Robert Sykes, Geoffrey Turner, Mark Davis, Steven Brown, Brian Davison, Zeng-Yu Wang, C. Neal Stewart, "Transgenic miR156 switchgrass in the field: growth, recalcitrance, and rust susceptibility," *Plant Biotechnol. J.* 16:39-49 (2018). DOI: 10.1111/pbi.12747

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Paul Gilna, Lee R. Lynd, Debra Mohnen, Mark F. Davis, and Brian H. Davison. "Progress in understanding and overcoming biomass recalcitrance: a Bioenergy Science Center (BESC) perspective." *Biotechnol for Biofuels*, 10:285 (2017), DOI 10.1186/s13068-017-0971-1; <http://rdcu.be/zWXs>

Kyle Sander, Kei-ji G. Asano, Deepak Bhandari, Gary J. Van Berkel, Steven D. Brown, Brian Davison, Timothy J. Tschaplinski. "Targeted Redox and Energy Cofactor Metabolomics in *Clostridium thermocellum* and *Thermoanaerobacterium saccharolyticum*." *Biotechnol Biofuels* 10:270 (2017) DOI 10.1186/s13068-017-0960-4; <http://rdcu.be/zWXC>

RS Nelson, CN Stewart Jr., J Gou, S Holladay, L Gallego-Giraldo, A Flanagan, DGJ Mann, H Hisano, WA Wuddineh, CR Poovaiah, A Srivastava, AK Biswal, H Shen, LL Escamilla-Treviño, J Yang, CF Hardin, R Nandakumar, C Fu, J Zhang, X Xiao, R Percifield, F Chen, JL Bennetzen, M Udvardi, M Mazarei, RA Dixon, Z-Y Wang, Y Tang, D Mohnen and BH Davison, "Development and use of a switchgrass (*Panicum virgatum* L.) transformation pipeline by the BioEnergy Science Center to evaluate plants for reduced cell wall recalcitrance." *Biotechnol for Biofuels*, 10:309 (2017), doi.org/10.1186/s13068-017-0991-x

Anne E. Harman-Ware, Renee M. Happs, Brian H. Davison, and Mark F. Davis, "The effect of coumaryl alcohol incorporation on the structure and composition of lignin dehydrogenation polymers." *Biotechnol Biofuels* (2017) 10:281; DOI 10.1186/s13068-017-0962-2; <http://rdcu.be/zWXz>

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Meng, Xianzhi; Evans, Barbara; Yoo, Chang Geun; Pu, Yunqiao; Davison, Brian; Ragauskas, Arthur. "The effect of in-vivo deuteration on structure of switchgrass lignin." *ACS Sus Chem Eng* 5: 8004-8010 (2017) DOI: 10.1021/acssuschemeng.7b01527

O'Neill, H; SV Pingali, L Petridis, JH He, E Mamontov, L Hong, V Urban, B Evans, P Langan, JC Smith, BH Davison. "Dynamics of water bound to crystalline cellulose," *Sci Reports* 7:11840 (2017) DOI: 10.1038/s41598-017-12035-w

Jeffrey V. Zurawski, Piyum A. Khatibi, Hannah O. Akinosho, Christopher T. Straub, Scott H. Compton, Jonathan M. Conway, Laura L. Lee, Arthur J. Ragauskas, Brian H. Davison, Michael W.W. Adams, and Robert M. Kelly. "Bioavailability of carbohydrate content in natural and transgenic switchgrasses for the extreme thermophile *Caldicellulosiruptor bescii*," *Appl. Env. Microbiol.* 83:unsp e00969 (2017) DOI: 10.1128/AEM.00969-17.

Evans, B. R., G. Bali, A. J. Ragauskas, H. O'Neill, R. Shah, Hugh O'Neill, Cory Howard, Fayola Lavenhouse, Dawn Ramirez, Kelly Weston, Kelly Ramey, Valerie Cangemi, Brian Kinney, Claudia Partee, Teresa Ware, and B. H. Davison, "Phytotoxicity and deuterium isotope effects of exogenous phenylalanine: A comparison of four monocot species" *Planta* 246:673-685 (2017) doi:10.1007/s00425-017-2720-x

Zhenglong Li, Z., A.W. Lepore, M.F. Salazar, Guo S.F., B.H. Davison, Z. Wu, C.K. Narula, "Selective Conversion of Bio-derived Ethanol to BTX over Ga-ZSM-5," *Green Chem* 19:4344-4352 (2017). DOI: 10.1039/c7gc01188a

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Dumitrache, Alexandru, Allison Tolbert, Jace Natzke, Steven D. Brown, Brian H. Davison, Arthur J. Ragauskasa, "Cellulose and Lignin Colocalization at the Plant Cell Wall Surface Limits Microbial Hydrolysis of Populus Biomass," *Green Chem.* 19:2275-2285 (2017) DOI: 10.1039/c7gc00346c

Farahi, R.H., A. Charrier, A. Tolbert, A. L. Lereu, A. Ragauskas, B. H. Davison, and A. Passian, "Plasticity, elasticity, and adhesion energy of plant cell walls: nanometrology of lignin loss using atomic force microscopy," *Sci Reports* 7 (152) (2017)

Lepore, A. W., L. Zhenglong, B. H. Davison, G-S Foo, Z Wu, and C. K. Narula, "Catalytic Dehydration of Biomass Derived 1-Propanol to Propene over M-ZSM-5 (M=H, V, Cu, or Zn)," *Indust. Eng. Chem. Res.*, 56(1) (2017). doi:10.1021/acs.iecr.7b00592

Dumitrache, A., D. M. Klingeman, J. M. Natzke, M. Rodriguez, Jr., R. J. Giannone, R. L. Hettich, B. H. Davison, and S. D. Brown, "Specialized activities and expression differences for *Clostridium thermocellum* biofilm and planktonic cells," *Sci Reports* 7:1-14 (2017).

Pingali, S. V., V. S. Urban, W. T. Heller, J. McGaughey, H. O'Neill, M. Foston, H. Li, C. E. Wyman, D. A. Myles, P. Langan, A. Ragauskas, B. Davison, and B. R. Evans, "Understanding Multiscale Structural Changes During Dilute Acid Pretreatment of Switchgrass and Poplar," *ACS Sustainable Chemistry & Engineering* 5:426-435 (2017).

Dumitrache, A., J. M. Natzke, M. Rodriguez, Jr., K. L. Yee, O. A. Thompson, C. R. Poovaiah, S. Hui, M. Mazarei, H. L. Baxter, N. L. Engle, C. Fu, Z.-Y. Wang, A. K. Biswal, G. Li, Y. Tang, T. J. Tschaplinski, N. C. Stewart, R. Dixon, R. S. Nelson, D. A. Mohnen, J. R. Mielenz, S. D. Brown, and B. H. Davison, "Transgenic Switchgrass (*Panicum virgatum* L.) with Reduced Recalcitrance to Bioconversion: A Two-Year Comparative Analysis of Five Different Types of Transgenes in the Field," *Plant Biotechnol. J.* 15:688-697 (2017). DOI: 10.1111/pbi.12666

Li, Z Zhenglong, Andrew Lepore, Brian H. Davison, and Chaitanya K. Narula, "Catalytic Conversion of Biomass-Derived Ethanol to Liquid Hydrocarbon Blendstock: Effect of Light Gas Recirculation," *Energy Fuels*, 30:10611-10617 (2016) DOI: 10.1021/acs.energyfuels.6b02562

Herring, C. D., W. R. Kenealy, A. J. Shaw, S. F. Covalla, D. G. Olson, J. Zhang, W. R. Sillers, V. Tsakraklides, J. S. Bardsley, S. R. Rogers, P. G. Thorne, J. P. Johnson, A. Foster, I. D. Shikhare, D. M. Klingeman, S. D. Brown, B. H. Davison, L. R. Lynd, and D. A. Hogsett, "Strain and Bioprocess Improvement of a Thermophilic Anaerobe for the Production of Ethanol from Wood," *Biotechnol. for Biofuels* 9:125 (2016); DOI: 10.1186/S13068-016-0536-8.

Passian, A., R. H. Farahi, and B. H. Davison, "Optonanomechanical Spectroscopic Imaging," *Imaging & Microscopy* (2016); <http://www.imaging-git.com/science/scanning-probe-microscopy/optonanomechanical-spectroscopic-imaging>.

Davison, B. H. and J. Lievens, "Technology Challenges and Opportunities in Commercializing Industrial Biotechnology," *Chem. Eng. Prog.* 112(6):35 (2016).

Paye, J. M. D., A. Guseva, S. K. Hammer, E. Gjersing, M. F. Davis, B. H. Davison, J. Olstad, B. S. Donohoe, T. Y. Nguyen, C. E. Wyman, S. Pattathil, M. G. Hahn, and L. R. Lynd, "Biological Lignocellulose Solubilization: Comparative Evaluation of Biocatalysts and Enhancement via Cotreatment," *Biotechnol. for Biofuels* 9:8 (2016); DOI: 10.1186/s13068-015-0412-y.

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Dumitrache, A., H. Akinosho, M. Rodriguez, Jr., X. Meng, C. Yoo, J. Natzke, N. Engle, R. Sykes, T. Tschaplinski, W. Muchero, A. Ragauskas, S. Brown, and B. Davison, “Consolidated Bioprocessing of *Populus* Using *Clostridium thermocellum*: A Case Study on Lignin Composition and Structure,” *Biotechnology for Biofuels* **9**:31 (2016); DOI: 10.1186/s13068-016-0445-x.

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Sander, K., C. M. Wilson, M. Rodriguez, Jr., D. M. Klingeman, T. Rydzak, B. H. Davison, and S. Brown, “*Clostridium thermocellum* DSM 1313 Transcriptional Responses to Redox Perturbation,” *Biotechnol. for Biofuels* **8**:211 (2015); DOI: 10.1186/s13068-015-0394–9.

Narula, C. K., Z. Li, E. M. Casbeer, R. A. Gieger, M. Moses-DeBusk, M. Keller, M. V. Buchanan, and B. H. Davison, “Heterobimetallic Zeolite InV-Zsm-5, Enables Efficient Conversion of Biomass Derived Ethanol to Renewable Hydrocarbons,” *Scientific Reports* **5**:16039 (2015); DOI: 10.1038/srep16039.

Currie, D. H., B. Raman, C. M. Gowen, T. J. Tschaplinski, M. L. Land, S. D. Brown, S. F. Covalla, D. M. Klingeman, Z. K. Yang, N. L. Engle, C. M. Johnson, M. Rodriguez, A. J. Shaw, W. R. Kenealy, L. R. Lynd, S. S. Fong, J. R. Mielenz, B. H. Davison, D. A. Hogsett, and C. D. Herring, “Genome-Scale Resources for *Thermoanaerobacterium saccharolyticum*,” *BMC Systems Biology* **9**:30 (2015); DOI: 10.1186/s12918-015-0159-x.

Tetard, L., A. Passian, R. H. Farahi, T. Thundat, and B. H. Davison “Opto-Nanomechanical Spectroscopic Material Characterization,” *Nature Nanotechnol.* **10**:870–877 (2015); DOI: 10.1038/nnano.2015.168.

Davison, B. H., C. C. Brandt, A. M. Guss, U. C. Kalluri, A. V. Palumbo, R. L. Stouder, and E. G. Webb, “The Impact of Biotechnological Advances on the Future of U.S. Bioenergy,” *Biofuels, Bioprod. Biorefin.* **9**:454–467 (2015); DOI: 10.1002/bbb.

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Ragauskas, A. J., G. T. Beckham, M. J. Bidddy, R. Chandra, F. Chen, M. F. Davis, B. H. Davison, R. A. Dixon, P. Gilna, M. Keller, P. Langan, A. K. Naskar, J. N. Saddler, T. J. Tschaplinski, G. A. Tuskan, and C. E. Wyman, "Lignin Valorization: Improving Lignin Processing in the Biorefinery," *Science* **344**:709+ (2014); DOI: 10.1126/science.1246843.

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Scott, C. D. and B. H. Davison, "Attrition Reactor System," U.S. Patent 5,248,484, issued date September 28, 1993.

BOOK CHAPTERS

O'Neill, H., R. Shah, B. R. Evans, J. He, S. V. Pingali, S. P. S. Chundawat, A. D. Jones, P. Langan, B. H. Davison, and V. Urban, "Chapter Six - Production of Bacterial Cellulose with Controlled Deuterium-Hydrogen Substitution for Neutron Scattering Studies," in "Isotope Labeling of Biomolecules – Labeling Methods," Z. Kelman (editor), *Methods in Enzymology* **565**:123–146 (2015). dx.doi.org/10.1016/bs.mie.2015.08.031

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Klasson, K. T., B. H. Davison, J. W. Barton, and J. E. Jacobs, "Removal of Chlorinated and Nonchlorinated Alkanes in a Trickle Bed Biofilter," *Proceedings of the 91st Annual Meeting of the Air and Waste Management Association*, San Diego, California, June 1998, Paper 98-WAA.06P.

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Davison, B. H. and E. N. Kaufman, "Enhanced Fermentation Systems with Continuous Removal of Inhibitory Products," *Proceedings of Corn Utilization Conference V*, St. Louis, Missouri, June 8–10, 1994.

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Davison, B. H., "Phase Holdup and Dispersion in a Three-Phase Fluidized-Bed Bioreactor with Low-Density Gel Beads," *Proceedings of Biochemical Engineering VI*, Santa Barbara, California, October 2–7, 1988, *Ann. NY Acad. Sci.* **589**:670–677 (1990).

Keay, L., J. J. Eberhardt, B. R. Allen, C. D. Scott, and B. H. Davison, "Improved Production of Ethanol and N-Butanol in Immobilized Cell Bioreactors," *Proceedings of the Physiology of Immobilized Cells*, Wageningen, The Netherlands, December 10–13, 1989, p. 539–543.

Friedly, J. and B. H. Davison, "Dynamic Behavior of a Natural Circulation Loop for a Solar Collector," *AIChE Symp. No. 198*, **76**:69–79 (1980).

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U.S. Department of Energy, *2016 Billion-Ton Report: Advancing Domestic Resources for a Thriving Bioeconomy, Volume 1: Economic Availability of Feedstocks*, M. H. Langholtz, B. J. Stokes, and L. M. Eaton (Leads), 448p.; ORNL/TM-2016/160, Oak Ridge National Laboratory, Oak Ridge, Tennessee (Contributor) (2016).

Nghiem, N. P. and B. H. Davison, "Continuous Ethanol Production Using Immobilized-Cell/Enzyme Biocatalysts in Fluidized-Bed Reactor (FBR)," Oak Ridge National Laboratory, ORNL/TM-2002/164 (November 2003).

Klasson, K. T. and B. H. Davison, "A General Methodology for Evaluation of Carbon Sequestration Activities and Carbon Credits," Oak Ridge National Laboratory, ORNL/TM-2002/235 (November 2002).

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Busche, R. M., C. D. Scott, B. H. Davison, and L. R. Lynd, "The Ultimate Ethanol: Technoeconomic Evaluation of Ethanol Manufacture, Comparing Yeast vs *Zymomonas* Bacterium Fermentations," ORNL/TM-11852, Oak Ridge National Laboratory, Oak Ridge, Tennessee (August 1991).

INVITED PANELS (SELECTED) AND RESULTING ROADMAPS IF AVAILABLE

Co-Organizer

USDOE "Biomass to Biofuels" Workshop, December 2005, "Breaking the Biological Barriers to Cellulosic Ethanol," DOE/SC-0095.

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“New Biocatalysts: Essential Tools for a Sustainable 21st Century Chemical Industry,” Council for Chemical Research and USDOE OIT, Palo Alto, California, November 16–18, 1999.
Nitrogen Economy DOE Lab Workshop, Oak Ridge, TN September 2016.

Organizing Committee/Session/Breakout Chair

“Vision 2020: 2000 Separations Roadmap,” AIChE Center for Waste Reduction Technologies and USDOE (2000).

“Alternative Feedstocks Program Technical and Economic Assessment: Thermal/chemical and Bioprocessing Components,” USDOE OIT, July 1993.

“The Technology Roadmap for Plant/crop-based Renewable Resources 2020,” National Corn Growers Association and USDOE-OIT, 2/1999, DOE/GO-10999-706.

“DOE Genomics:GTL Roadmap – Systems Biology and the Environment,” DOE/SC-0090, August 2005.

“Systems Biology Knowledgebase for a New Era in Biology – A Genomics:GTL Report from the May 2008 Workshop,” DOE/SC-0113.

“New Frontiers in Characterizing Biological Systems – Report from the May 2009 Workshop,” DOE/SC-0121.

“DOE Systems Biology Knowledgebase Implementation Plan – From the Knowledgebase System Development Workshop, June 13, 2010, in Crystal City, Virginia,” September 2010.

Participant

“U.S. Government Accountability Office – Expert Meeting on Advanced Biofuels Research and Development,” NAS, Washington DC, May 2016; resulting in “RENEWABLE FUEL STANDARD: Low Expected Production Volumes Make It Unlikely That Advanced Biofuels Can Meet Increasing Targets,” GAO-17-108, November 2016

“DOE Bioproducts to Enable Biofuels Workshop,” Westminster, Colorado, July 2015, DOE/EE-1294 December 2015.

“DOE-OBP: Workshop on Conversion Technologies for Advanced Biofuels,” Arlington, Virginia, December 6–8, 2011.

“Microbial Energy Conversion,” American Academy of Microbiology, workshop March 2006.

“National Algal Biofuels Technology Roadmap – National Algal Biofuels Workshop, December 2008,” May 2010, DOE/EE-0332.

Review panels for USDA, SBIR, NSF Biocatalysis (December 2012), and DOE (BETO, BER, EPSCOR).

Biosafety Assessment and review for NREL, August 2017.

STUDENTS

5 Years: Ph.D.: Kyle Sanders, Andrew LePore, Riddhi Shah, Punita Manga

Past: MS: C. L. Cheng, Greg DeLozier, Paula A. Cameron, Miguel Rodriguez, Jr.

Ph.D.: Mai Y. Sun

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Post-Degrees Studies

5 Years: Alexandre Dumitrache, Kelsey Yee, Erik Casbeer, and Zhenglong Li,

Past: John W. Barton, Ping Wang, Laurel O'Connor, Manesh S. Krishnan

CONFERENCES (recent)

Commercializing Industrial Biotechnology Chair 9/2015, San Diego, CA. Organizing committee 2017 and 2019.

RECENT SELECTED INVITED PRESENTATIONS (2010–PRESENT)

“Modes of Research Collaboration among the Bioenergy Research Centers,” Bioenergy Research Center Coordination and Readiness Assessment meeting, Washington, DC, October 2017

“The legacy of the BioEnergy Science Center (BESC) and the future with the Center for Bioenergy Innovation (CBI),” Joint BioEnergy Institute Annual Retreat. Monterrey CA, September 2017.

“Structure and function of Biomass in bioprocessing,” University of Tennessee Institute of Agriculture Center for Renewable Carbon seminar, Knoxville, TN July 2017

“Microbial hydrolysis of Populus biomass is limited by cellulose and lignin colocalization at the plant cell wall surface,” Symposium on Biotechnology for Fuels and Chemicals, San Francisco CA May 2017

“Novel Vertimass catalyst for ethanol conversion into renewable jet, diesel, and gasoline blend stocks and high value co-products,” Symposium on Biotechnology for Fuels and Chemicals, San Francisco CA May 2017

“The Nitrogen Economy: the role of new biological and environmental sciences,” seminar to DoE BER staff, Germantown, MD April 2017

“Overcoming Recalcitrance in the Improvement of Biofeedstocks via Genomic Research,” Advance Bioeconomy Leadership Conferences, Washington DC, February 2017

“the Nitrogen Economy,” DOE Big Ideas Preliminary Proposal Review, Berkeley CA January 2017

“Bioenergy and Bioproducts Research at ORNL,” briefing to P&G staff, ORNL, January 2017

“Neutron Scattering and Simulation Provide Insights into Fundamental Mechanisms of Biomass Pretreatment,” DOE-BER Genomic Sciences Meeting, March 2016.

“Commercializing Industrial Biotechnology – Closing Summary of the State of the Field,” Co-Chair: Commercializing Industrial Biotechnology Workshop – Society of Biological Engineering, San Diego, California, September 28–29, 2015.

“Dynamics and Coexistence in Applied Biochemical Engineering,” session in honor of 65th birthday of Gregory Stephanopoulos, AIChE Annual Meeting, Salt Lake City, November 2015.

“Biorefineries and Bioconversions: Current and Future Challenges,” plenary talk for the International Bioenergy Conference, Manchester, United Kingdom, March 11–13, 2014.

“Strategies for Increased Bio-Based Fuels – Biotechnology and Recalcitrance,” plenary talk for Section 15c, AIChE Annual Meeting, Atlanta, Georgia, November 2014.

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“Bioconversion Challenges and Opportunities,” NSERC Bioconversion Network Enzyme Hydrolysis Workshop and 5th AGM, Montreal, Canada, June 2–4, 2014.

“DOE Bioenergy Research Center Achievement and Technology Transfer,” 11th World Congress on Industrial Biotechnology, Philadelphia, Pennsylvania, May 12–15, 2014.

“Strategies for Increased Bio-Based Fuels - with a Focus on Biotechnology Solutions to Recalcitrance,” BSRI 2014 Annual Retreat, “The Future of Bioenergy,” Athens, Georgia, May 2, 2014.

“Metabolic and Process Engineering in Industrial Scale-up of Biobased Products,” 11th World Congress on Industrial Biotechnology, Philadelphia, Pennsylvania, May 12–15, 2014.

“Existing Challenges and the Future of Bioenergy and Bioproducts Development in Canada,” FIBRE Conference Cornwall, Ontario, Canada, June 2013.

“The Promise and Progress of University Bioenergy Research” 2012 Georgia Energy Solutions for the Southeast Meeting, Tifton, Georgia, November 29, 2012.

“Bioconversion” NSERC AGM and Pretreatment Workshop, Vancouver, B.C., Canada, June 4–6, 2012.

“Progress of Research in Bioenergy Centers: an update on the major DOE and other Bioenergy Research Centers,” Bioenergy BIO International Convention, June 27–30, 2011, Washington, D.C.

“Overcoming Biomass Recalcitrance,” Oklahoma ESPCoR Annual State Conference, University of Oklahoma, Norman, Oklahoma, April 29, 2010.

“Advances in Conversion and Sustainability at BESC – A DOE Bioenergy Research Center,” 6th World Congress on Industrial Biotechnology and Bioprocessing, Montreal, Canada, July 19–22, 2009.

PAST SELECTED INVITED PRESENTATIONS (1999–PRESENT)

“BioEnergy Science Center” in “Developing a Cellulosic Biofuels Industry: The Tennessee Biofuels Initiative,” BIO Pacific Rim Summit, November 11–16, 2007, Honolulu, Hawaii.

“BioEnergy Science Center: Initial Results in Overcoming Biomass Recalcitrance,” BIOMASS 2009: Fueling Our Future, National Harbor, Maryland, March 17–18, 2009.

“Structural Understanding of Key Physical Properties in the Pretreatment and Enzyme Hydrolysis of Biomass,” AIChE Annual Meeting, San Francisco, California, November 2013.

“Strategies to Generate Biofuels from Cellulosic Biomass by Overcoming Recalcitrance at the BioEnergy Science Center,” AIChE Annual Meeting, San Francisco, California, November 2013.

By invitation of the Ministry of Science and Technology – P.R. China, “Integrated Bioproducts and Separations,” International High Level Forum on Bioeconomy, Beijing, China, September 14–16, 2005.

Davison, B. H., “Nontraditional Biocatalysis,” BIO 2001, Annual Meeting of the Biotechnology Industry Organization, San Diego, California, June 24–27, 2001.

Davison, B. H., A. Mulchandani, A. Borole, C. Cheng, and M. Rodriguez, Jr., “Perioxidase-Catalyzed Epoxidation of Alkenes,” 221st ACS National Meeting, American Chemical Society, San Diego, California, April 1–5, 2000.

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Nghiem, N. P., M. I. Donnelly, and B. H. Davison, "Production of Succinic Acid from Lignocellulosic Materials," 221st ACS National Meeting, American Chemical Society, San Diego, California, April 1–5, 2001.

Davison, B. H., J. W. Barton, T. K. Klasson, and L. E. O'Connor, "Removal and Destruction of CWA Simulants Using 'Dry' Enzyme-Impregnated Fabrics and Coatings," Booz-Allen & Hamilton, Inc., International Symposium on Applications of Enzymes in Chemical and Biological Defense, Orlando, Florida, May 13, 2001.

Davison, B. H., J. W. Barton, A. B. Francisco, and K. T. Klasson, "The Effect of Biomass on the Measured Solubility of Sparingly Soluble Organics in Aqueous Bioremediation Systems," 2000 USC-TRG Conference on Biofiltration, Los Angeles, California, October 18–20, 2000.

Nghiem, N. P., B. H. Davison, and T. M. Cofer, "Comparison of Ethanol Production from Lignocellulosic Sugars by Two Chromosomally Integrated Microbial Strains in a Fluidized-Bed Reactor," 23rd Symposium on Biotechnology for Fuels and Chemicals, Breckenridge, Colorado, May 6–9, 2001.

Davison, B. H., T. Kuritz, and C. K. McKeown, "Green Biopolymer for Decon of Contaminated Surfaces," Presentation at *Decontamination, Demolition and Restoration (DD&R) Topical Meeting on Site Restoration of Government and Commercial Facilities*, Knoxville, Tennessee, September 12–16, 1999.

Davison, B. H., T. Kuritz, J. W. Barton, and C. K. McKeown, "Green Biopolymers for Decontamination of Metals from Surfaces," oral and poster presentation at AEMSP Review Meeting, Atlanta, Georgia, April 2000.

Davison, B. H., T. Kuritz, C. K. McKeown, and J. W. Barton, "Green Biopolymer Coatings for Improved Decontamination of Metals from Surfaces," Platform presentation at 13th Annual Technical Information Exchange (TIE) Workshop, Albuquerque, New Mexico, November 13–15, 2001.