

**Curriculum Vitae**

**Terry H. Walker, Ph.D., EIT**

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**Biography:** Born in Abingdon, Virginia, March 19, 1966 to Dr. George E. Walker, Doctor of Medicine, University of VA, and Mrs. Pam P. Walker, professional artist, writer, method actress and teacher of the arts. Attended Marion Senior High School, Marion, VA and graduated in May, 1984.

sailing, tennis, biking, classical/folk/rock/gypsy jazz guitar, and watercolor painting.

**Biosketch:** Dr. Terry H. Walker is a professor of biosystems engineering (BE) with over 20 years of experience in sustainable bioprocess engineering. He obtained his Ph.D. in biosystems engineering in 1997 from the University of Tennessee in cooperation with the Chemical Technology Division at Oak Ridge National Laboratory. He was an assistant professor of

biological engineering at Louisiana State University from 1997 to 2002 and then joined Clemson University Biosystems Engineering in late 2002. In 2011 he joined the EEES department where the BE program is now located. His research focuses on biorefinery concepts for the integrated bioconversion of feedstock materials to bioenergy components (switchgrass to fuel ethanol, algal lipids to biodiesel esters and biomass power production), nutraceuticals (essential lipids emphasizing w-3 FA metabolism), and hydrolytic enzymes. Separation processes include supercritical fluid extraction (SFE) emphasizing thermodynamic and computational transport modeling. Dr. Walker obtained more than \$3.5 M in research and educational funding (\$1.5 M in research instrumentation and pilot bioprocessing equipment). He authored more than 30 peer-reviewed research articles and proceedings, one biofuels textbook, 4 book chapters, and over 10 public communications. He was invited to present at more than 20 national and international professional conferences. He currently develops biorefinery concepts collaborating with Savannah River National Laboratory (SRNL), USDA-ARS, and biomass/bioenergy-related industries. He was a recent member of the SC Biomass Council (directed by SC State Energy Office) and Clemson President's Commission on Sustainability (PCS) ex-officio member. He served on grant review panels for Department of Energy renewable energy programs and reviewer for many bioenergy and nutraceutical related journals (Bioresource Technol, Biotechnol Biofuels, Biomass, Applied Energy, J Supercritical Fluids, etc.). He has taught the following courses: BE/ChE 4280/6280: Biochemical Engineering; BE 4380/4381/6380/6381: Bioprocess Engineering Design; BE 8380: Advanced Bioprocess Engineering; BE 8650: Advanced Biological Transport Processes; and co-taught BE 4400: Renewable Energy Engr. Extracurricular activities include sustainable practices: renewable energy consulting with Resilient Biosystems LLC, Green Light SC under the umbrella of Green Light New Orleans – a non-profit business installing raised-bed organic gardens and energy-efficient lights into low-income homes.

Recent Grants: USDA Sun Grant *Bioleaching of Biomass to Improve Thermochemical Conversion Characteristics with Reduced Emissions* \$141,714 (Zheng (PI), Walker); US Dept of Energy Bioenergy funds, Bioethanol Collaborative (Clemson and SRNL 2008-2012), \$3,200,000 (Walker \$472,414); US Cotton, SC Cotton Board and Cotton, Inc. (2007-current), *Pilot enzymatic production of biodiesel and coextraction of antioxidants from cottonseed oil*, \$58,867; Clemson University Public Service Activities and USDA: Bioprocessing equipment grant (2009), \$798,000; SC Peach Council, *Byproduct utilization of peach culls for production of bioenergy and nutraceuticals* (2006-2010), \$41,000 (Co-PI, Dr. CM Drapcho)

## Education:

**University of Tennessee**, Knoxville. Ph.D, 1997, Biosystems Engineering, Co-advisors: Dr. Hank Cochran, Director of ORNL Chemical Technology Division and Dr. Greg Hulbert, UTK

**University of Tennessee**, Knoxville. M.S., 1992, Biosystems Engineering; bioprocess engineering emphasis; minor in food science and technology, Advisor: Dr. Luther Wilhelm

**University of Tennessee**, Knoxville. B.S., 1989, Engineering Science and Mechanics; biomedical engineering concentration; completed biochemistry B.S. and premedicine requirements

## Professional Experience:

2008 – present: **Clemson University**, Clemson, SC, Professor, Biosystems Engineering

2002 – 2008: **Clemson University**, Clemson, SC, Associate Professor, Biosystems Engineering; Adjunct Professor, LSU Biological Engineering

1997 – 2002: **Louisiana State University**, Baton Rouge, LA, Assistant Professor, Biological Engineering; Adjunct Professor, Food Science and Audubon Sugar Institute

1993 - 1997 **University Of Tennessee**, Knoxville, TN, Staff Research Associate, Food Science and Technology in cooperation with ORNL

## Publications

### Peer-Reviewed Journals

- Lepak GS, BR. Moser, E Bakota, J Sharp, CD Thornton , TH Walker, 2016, Improved oxidative stability of biodiesel via alternative processing methods using cottonseed oil, *Int J Sustainable Engineering*, accepted for publication.
- Zheng Y, M Roberts, J Kelly, N Zhang, TH Walker, 2015, Harvesting microalgae using the temperature-activated phase transition of thermoresponsive polymers, *Algal Research* (5yIF: 5.03), 11: 90-94.
- Jain A, TH Walker\*, J Toler, TH Kim, 2014, Effect of Soaking in Aqueous Ammonia (SAA) Pretreatment on Switchgrass for the Production of Cellulases Using *Trichoderma reesei* Rut C-30, *Biological Eng Trans*, 7(2): 69-81.
- Xiaoyu Feng; Terry H Walker; William C Bridges; Charles Thornton; Karthik Gopalakrishnan, 2014, Biomass and lipid production of *Chlorella protothecoides* under heterotrophic cultivation on a mixed waste substrate of brewer fermentation and crude glycerol, *Bioresource Technology* (5yIF: 5.35), 166:17-23. On line: <http://www.sciencedirect.com/science/article/pii/S0960852414004258>
- Nhuan P. Nghiem, Chon M. Nguyen, Caye M. Drapcho, Terry H. Walker, 2013, Sweet Sorghum Biorefinery for Production of Fuel Ethanol and Value-Added Co-products, *Biological Engineering Transactions*. 6(3): 143-155. (doi: 10.13031/bet6.9926)
- Chen YH, Walker TH, 2012, Fed-batch fermentation and supercritical fluid extraction of heterotrophic microalgal *Chlorella protothecoides* lipids, *Bioresource Technol* (5yIF: 5.35), 114:512-7.
- Joshi H, Moser BR, Walker TH, 2012, Mixed alkyl esters from cottonseed oil: Improved biodiesel properties and blends with diesel fuel, *JAOCS* (5yIF: 2.18), 89(1):145-153.
- Kuan CY, Walker TH, Luo PG, Chen CF, 2011, Long-chain polyunsaturated fatty acids promote paclitaxel cytotoxicity via inhibition of the MDR1 gene in the human colon cancer Caco-2 cell line, *J Am College Nutr* (IF: 2.29), 30:265-273.
- Chen YH, TH Walker, 2011, Biomass and lipid production of heterotrophic microalgae *Chlorella protothecoides* by using biodiesel derived crude glycerol, *Biotechnol Letters* (IF: 1.68), 33(10):1973-1983.
- Joshi H, Moser BR, Toler J, Smith WF, Walker TH, 2011, Ethyl levulinate: A potential bio-based diluent for biodiesel which improves cold flow properties, *Biomass Bioenergy* (5yIF: 4.62), 35, 3262-3266.
- Joshi H, Moser BR, Toler J, Smith WF, Walker TH, 2010, Effects of blending alcohols with poultry fat methyl esters on cold flow properties, *Renewable Energy* (5yIF: 3.20), 35, 2207-2210.
- Joshi H, Moser BR, Shah SN, Mandalike A, Walker TH, 2010, Improvement of fuel properties of cottonseed oil methyl esters with commercial additives, *Eur J Lipid Sci Technol* (IF: 1.73), 112(7): 802-809.
- Joshi HC, BR Moser, TH Walker\*, 2010, Preparation and fuel properties of biodiesel prepared from soybean oil using mixtures of methanol and ethanol, *Biomass Bioenergy* (5yIF: 4.62), 34(1):14-20.
- Joshi HC, J Toler and T Walker\*, 2009, Biodiesel from canola oil using a 1 : 1 molar mixture of methanol and ethanol, *Eur. J. Lipid Sci. Technol.* (IF: 1.73), 111, 464–473.
- Cantrell, K and TH Walker, 2009, Influence of temperature growth and peak oil biosynthesis in a carbon-limited medium by *Pythium irregulare*, *JAOCS* (5yIF: 2.18), 86(8):791-797.

- Dong M, Walker T, 2008, Production and recovery of polyunsaturated fatty acids-added lipids from fermented canola, *Bioresource Technol* (5yIF: 5.35), 99(17):8504-6.
- Dong M, Walker T, 2008, Addition of Polyunsaturated Fatty Acids to Canola Oil by Fungal Conversion, *Enzyme Microbial Technol* (5yIF: 3.04), 42, 514-520.
- Joshi HC, Toler J and Walker T, 2008, Optimization of Cottonseed Oil Ethanolysis to Produce Biodiesel High in Gossypol Content, *JAOCS* (5yIF: 2.18), 85, 357-363.
- Dong M, TH Walker, 2008, Characterization of high-pressure carbon dioxide explosion to enhance oil extraction from canola, *J Supercritical Fluids* (5yIF: 3.15), 44(2): 193-200.
- Walker TH, WH Allen and CM Drapcho. 2006. A Zero-Based Curriculum Revision in Biological Engineering: Challenges for a New Century, *Int. J Eng Ed.* (IF: 0.418), Vol. 22(6): 1123-1128.
- Hua N, RJ Bengtson, RC Schramm, PM Patel, TH Walker, M Lima, 2006. Optimization of yield and quality parameters for the Cocodrie rice variety as a function of harvest time. *Appl. Eng. Agricult.* (IF: 0.53), 22(1): 95-99.
- Lakkakula, NR, Lima, M., Walker, T.H. 2004. Rice bran stabilization and rice bran oil extractaion using ohmic heating. *Bioresource Technol.* (5yIF: 5.35), 92: 157-161.
- Lima, M., CM Drapcho, TH Walker, R Bengtson, L Verma, 2001, A model for integrating communication skills across the biological engineering curriculum. *Int. J. Eng. Ed.* **17(1)**:67-74.
- Walker TH, HD Cochran and GJ Hulbert, 1999, Supercritical carbon dioxide extraction of lipids from *Pythium irregulare*. *JAOCS.* **76(5)**, 595-602.
- Cheng MH, TH Walker and GJ Hulbert. 1999. Fungal production of eicosapentaenoic acid from soybean oil in an external-loop airlift bioreactor. *Bioresource Technol.* **67(2)**:101-110.
- Hulbert GJ, RN Biswal, KB Mehr, TH Walker and JL Collins. 1997. Solid/liquid extraction of caffeine from guaraná with methylene chloride. *Food Sci. and Technol. Int.* **4**:53-58.
- Walker, TH and LR Wilhelm. 1995. Drying fruit with recirculated air for energy savings. *Appl. Eng. Agricult.* **11(6)**:861-867.

**Books and Book Chapters:**

- Walker TH, M Dong and P Patel, 2010, Ch. 16: Supercritical Fluid Extraction Applications for Biosystems Engineering. In *Biosystems Engineering*, ed. A. Nag, McGraw-Hill, New York. ISBN: 978-0-07-160628-8.
- Drapcho, CM, TH Walker and N Nghiem, 2008, *Bioprocess Engineering for Biofuels Production*. McGraw-Hill, New York. ISBN: 0071487492
- Walker, TH, P Patel, and KB Cantrell, 2007. Supercritical fluid extraction and other technologies for extraction of high-value food processing co-products, Chapter 10 in *Waste management and co-product recovery in food processing*, ed. Keith Waldron, Woodhead Publishing Lmt., London, UK. ISBN 1 84569 025
- Walker, TH, CM Drapcho, F Chen. 2006. Bioprocessing technology for production of nutraceutical compounds. Chapter 9 in "Functional Food Ingredients and Nutraceuticals: Processing Technologies" ed. John Shi. CRC Press, Boca Raton, FL. ISBN: 9780849324413
- Walker, TH, JM Chaar, C Mehr. Guaraná, 1999. Brazil's super fruit for the caffeinated beverage industry. Ed. T.H. Parliament, C.T. Ho and P. Schieberle. Chapter 31: The Chemistry of Guaraná. Symposium Series No. 754. Caffeinated Beverages: Health Benefits, Physiological Effects, and Chemistry. Oxford University Press, UK, ISBN: 0-8412-3654-2.

**Dissertation and Thesis:**

- Walker, T.H. 1997. Supercritical carbon dioxide extraction of lipids from *Pythium irregulare*. Ph.D. Dissertation, Biosystems Engineering, University of Tennessee, Knoxville.
- Walker, T.H. 1992. Drying cut fruits with recirculated air for energy savings. M.S. Thesis, Biosystems Engineering, University of Tennessee, Knoxville.

**Patents**

- Patent 8,148,559: Walker TH, M Dong, K Cantrell, M Thies, Supercritical Fluid Explosion Process to Aid Fractionation of Lipids from Biomass. April 3, 2012.
- Provisional Patent: Walker TH, A Jain, Pretreatment formulation for recalcitrant feedstock for biofuel conversion processes. Filing Date: March, 2012. Attorney docket no: cxu-699-p(2012-020)



## Professional Society Affiliations, Achievements, Professional Service:

- ✦ Member of Institute of Biological Engineers (IBE); USDA-NIFA Research Committee S-1041 (Science and Engineering for a Biobased Industry and Economy); SC Biomass Council; Phi Kappa Phi and Gamma Sigma Delta Honor Societies; Sigma Xi Scientific Research Society
- ✦ BE Graduate Program Chair, EEES Dept., 2011-present
- ✦ BE ABET committee Chair, EEES Dept., July 2015-present
- ✦ Energy Subcommittee member of the President's Commission on Sustainability (PCS), 2010-present
- ✦ Served on EEES Curriculum (2011-present), TPR (2011-present), PTR (2014-present), Strategic Planning (2014-present), Department Chair Search (2014) committees.
- ✦ Chair of EEES Space committee, 2011-2013, and EEES Quality Assurance committee, 2014
- ✦ BE Chair of Peer Evaluation (TPR) Committee, 2010-2011
- ✦ Biosystems Engineering Recruiting committee: College of Engineering and Science Freshman Engineering Program, 2005-present. Demonstrations of biofuel technology and analytical laboratories.
- ✦ STEM advisor and Reviewer for 2015 Clean Tech Competition
- ✦ International thesis reviewer for University of Queensland, AU
- ✦ Peer reviewer for Biological Engineering related journals: Bioresource Technol, Biotechnol Biofuels, Biological Eng Trans, Biomass, Applied Energy, Applied Catalyst A, JAOCS, Ind Chem Eng Res, Bioenergy, J Ag Food Chem, J Food Eng, J Ind Crops Products.
- ✦ ACC Energy Challenge 2014, Brewcovery®: Recovering Value from Food Service and Brewery Wastes "Waste is but a resource misused", \$5000 winner of 2<sup>nd</sup> prize at ACC Challenge, University of Maryland. PIs: CD Thornton, K Gopalakrishnan, H Garrett, T Walker, S Jadrnicek, A Pellet. See: <https://www.youtube.com/watch?v=DaqDfy0A0oI&feature=youtu.be>
- ✦ ACC Energy Challenge 2013, Brewcovery®: Recovering Value from Food Service and Brewery Wastes "Waste is but a resource misused", \$5000 winner of 2<sup>nd</sup> prize at ACC Challenge, NC State University, Raleigh, NC. PIs: CD Thornton, H Garrett, T Walker, S Jadrnicek, A Pellet. See: <https://www.youtube.com/watch?v=DaqDfy0A0oI&feature=youtu.be>
- ✦ Association of South Carolina Energy Managers 2011 Energy Project of the Year award, Clemson Sustainable Biofuels Initiative: Tony Putnum, David Thornton, Terry Walker, et al.
- ✦ ACS Certificate of Appreciation, 2011 for valuable contribution and dedicated service in the peer review of manuscripts submitted to ACS journals.
- ✦ Elected to SC Biomass Council (SC Energy Office), 2010-2013
- ✦ Elected to City of Clemson Green Ribbon Committee (Mayor's office), 2009-2013
- ✦ Served as grant reviewer for DOE NREL and USDA biomass energy initiatives, 2008
- ✦ SCBio reward (2006) – research reward for development of marine-based antibiotics project
- ✦ IBE Presidential Citation in recognition of service to the organization (2006)
- ✦ Elected chair of meetings committee, Institute of Biological Engineers (IBE) Council (2006)
- ✦ 2007, 2010 CAFLS Tailgate Dept Display awards, 2<sup>nd</sup> Place "Clemson Pilot Biodiesel Facility".
- ✦ NSF and the Journal Science finalist: Science and Engineering Visualization Challenge, 2006 and Sigma Xi Science as Art Exhibit – 6<sup>th</sup> place for "Pythium Starry Sun" with Dr. Caye Drapcho
- ✦ Elected secretary (2003-04) and chair (2005) USDA S1007 (now S1041) Multistate Project: Science and Engineering for a Biobased Industry and Economy
- ✦ 2002 *Tiger Athletic Foundation Award* Outstanding Teacher (Assistant Professor)
- ✦ Awarded "Most Outstanding Graduate Student with Professional Promise" from Biosystems Engineering Department, University of Tennessee, 1997
- ✦ EIT (FE) Registration #: 14550, 12/31/92, State of Tennessee